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The allowability and allocability of independent research and development (IR&D) and BID and proposal (B&P) costs

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THESIS

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OF
INDEPENDENT RESEARCH AND DEVELOPMENT (IR&D)
AND
BID AND PROPOSAL (B&P) COSTS

by

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ABSTRACT

For some time there has been controversy about and an increasing amount of attention to business costs which have been labeled as independent research and development (IR&D) and bid and proposal (B&P) costs. This thesis examines these costs in order to bring clearer understanding to what they are, why they are undertaken, how they are accounted for, and how they should be managed and paid for. This is accomplished by reviewing the objectives of IR&D and B&P costs, examining the past and present environment in which these efforts have been and are being conducted, and identifying issues and problems confronting both industry and Government. Because the Department of Defense is the largest Government procurer, emphasis is placed on its policies and procedures and the effects they have on industry.

Research for this thesis was conducted by (1) review of related literature, (2) interviews with knowledgeable personnel, and (3) a questionnaire which was sent to personnel in Government and industry who are directly involved with these costs.

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I. INTRODUCTION

For some time there has been controversy about and an increasing amount of attention to business costs which have been labeled as independent research and development (IR&D) and bid and proposal (B&P) costs. Because of the diversity of viewpoints indicated by the various interested parties with respect to the Government's treatment, which is prescribed by statutes and regulations, it is evident that there is much lack of agreement as to the nature and purpose of these costs.

The intent of this thesis is to examine these costs in order to bring clearer understanding to what they are, why they are undertaken, and how they should be managed and paid for. This is accomplished by reviewing the objectives of IR&D and B&P costs, examining the past and present environment in which these efforts have been and are being conducted, and identifying issues and problems confronting both industry and Government. Because the Department of Defense is the largest Government procurer, emphasis is placed on its policies and procedures and the effects they have on industry.

Research for this paper has been conducted by (i) review of related literature, (ii) interviews with knowledgeable personnel, and (iii) a questionnaire which was sent to personnel in Government and industry who are directly involved with these costs.

The IR&D and B&P questionnaire (included as Appendix A) was designed as a research tool to determine certain approaches, preferences, and attitudes about statements relevant to accounting for IR&D and B&P costs. Respondents were asked how much they agreed or disagreed with statements related to present procedures and to possible improvements for the future.

The written questionnaires were distributed to 69 of the nation's largest industrial Government contractors believed to have an interest in the Government's policies and procedures related to IR&D and B&P costs. An additional 30 questionnaires were distributed to Government contracting officers who were directly associated with Government policies and practices related to IR&D and B&P costs.

The data collected from returned questionnaires were tabulated, summarized and processed on an IBM 360/67 computer at the Naval Postgraduate School, Monterey, California. The computer program used to compile the data was the Statistical Package for the Social Sciences (SPSS). Frequency distributions were made of the data. Where appropriate and possible, statistical measures were calculated. The results were used for evaluation and they are included in Appendix A.

Classification of returned questionnaires by size of company, line of business and experience with Government contracts indicated that returns represented a fairly broad scope of contractors. The general tone of the responses was cooperative and constructive.

The overall response was 43.5 percent from industry and 60.0 percent from Government personnel. Interpretation of responses to the questionnaire posed some difficulty. In some cases, categorical answers were qualified in accompanying narrative comment. Balancing comments against tabulations of bare categorical replies constituted a significant problem in interpreting data.

A. WHAT ARE INDEPENDENT RESEARCH AND DEVELOPMENT (IR&D) AND BID AND PROPOSAL (B&D) COSTS?

Independent research and development is defined as follows [Armed Services Procurement Regulation (ASPR) Section 15-205.35, 1973]:

A contractor's independent research and development effort (IR&D) is that technical effort which is not sponsored by, or required in performance of, a contract or grant and which consists of projects falling within the following three areas: (i) basic and applied research, (ii) development, and (iii) systems and other concept formulation studies. IR&D effort shall not include technical effort expended in the development and preparation of technical data specifically to support the submission of a bid or proposal. For the purposes of this paragraph:

(1) Basic Research is that research which is directed toward increase of knowledge in science. The primary aim of basic research is a fuller knowledge or understanding of the subject under study, rather than any practical application thereof.

(2) Applied Research is that effort which (a) normally follows basic research, but may not be severable from the related basic research, (b) attempts to determine and exploit the potential of scientific discoveries or improvements in technology, materials, processes, methods, devices, or techniques, and (c) attempts to advance the state of the art. Applied research does not include efforts whose principal aim is design, development, or test of specific items or services to be considered for sale; these efforts are within the definition of the term "development," defined below.

(3) Development is the systematic use, under whatever name, of scientific and technical knowledge in the design, development, test, or evaluation of a potential new product or service (or of an improvement in an existing product or service) for the purpose of meeting specific performance requirements or objectives. Development shall include the functions of design engineering, prototyping, and engineering testing.

(4) Systems and other concept formulation studies are analyses and study efforts either related to specific IR&D efforts or directed toward the identification of desirable new systems, equipments or components, or desirable modifications and improvements to existing systems, equipments, or components.

(5) Company includes all divisions, subsidiaries, and affiliates of the contractor under common control.

Bid and proposal costs are defined as follows [ASPR Section 15-205.3, 1973]:

Bid and proposal (B&P) costs are the costs incurred in preparing, submitting, and supporting bids and proposals (whether or not solicited) on potential Government or non-Government contracts which fall within the following:

(1) Administrative costs including the cost of the nontechnical effort for the physical preparation of the technical proposal documents and also the cost of the technical and nontechnical effort for the preparation and publication of the cost data and other administrative data necessary to support the contractor's bids and proposals, and

(2) Technical costs incurred to specifically support a contractor's bid or proposal, including the costs of system and concept formulation studies and the development of engineering and production engineering data.

The term IR&D refers to that part of a contractor's total research and development program which is not under a direct contract or grant and is an effort which is planned, sponsored, and directed internally. It is essentially a company's self-initiated research and development program performed in areas selected at its discretion and is undertaken to help it to be in a position to produce new or improved techniques, information, concepts, and products. Generally, IR&D is more relevant to the future business of the company than to its current production and may not be directly related to the Government as a potential customer. It is recognized as a normal and necessary function of business.

Other technical and engineering activities of a company, such as those involved in developing contract bids and proposals, are often quite similar to the technical and engineering activities performed under IR&D programs. They are distinguished by the purpose for which the work is being conducted. IR&D is conducted to maintain or advance the technological capability of the company, whereas B&P is conducted to convince the buyer that the company is the most capable supplier for a particular need. B&P is so closely related to IR&D that it must necessarily be considered in any discussions or deliberations concerning that subject. Hence, unless otherwise indicated, any discussion of IR&D in this paper may be assumed to have similar application to B&P.

When the sealed-bid, fixed-price technique of Government procurement can be used, IR&D and B&P costs are presumably included in the quoted price and not usually questioned because the purely competitive situation automatically controls the amount of reimbursement for direct and

indirect costs. Pure competition may be defined as follows [Harris, 1956, p. 313]:

> A market is purely competitive if there are so many buyers and sellers of an essentially identical product that no one can have an appreciable influence on price by varying the amount he offers to buy or sell, and if firms can enter or leave freely in response to market forces.

However, in many situations where the Government may be the only buyer of specialized products and services, the automatic control by the competitive marketplace is not possible and the appropriate amount of cost reimbursement for IR&D and B&P is not clear-cut. In these situations the Government does influence price by varying the amount it offers to buy, and firms cannot leave the market freely. The necessity of cost constraints in this specialized marketplace has led to the development of surrogate controls to replace those inherent in the price-competitive marketplace.

The surrogate controls -- such as requiring the contractor to submit brochures describing planned programs, conducting technical evaluations of such planned programs, negotiating the extent of Government cost participation in advance of cost incurrence, and requiring cost sharing by the contractor -- have been developed to determine the amount of IR&D which will be paid for by the Government. These controls continue to be the focal point of much disagreement. IR&D and B&P costs are perplexing issues because, while nearly everyone agrees that both are legitimate cost elements of doing business, great controversy arises over the fine line separating legitimacy and illegitimacy with respect to Government recognition of these costs.

B. INNOVATION IN RESEARCH AND DEVELOPMENT

The value of IR&D can be seen by realizing the necessity of individual companies, industry as a whole, military and other Government agencies,

and the entire nation having available a reservoir of advanced scientific information and expertise to meet changing consumer and national needs. This reserve of scientific knowledge must be more extensive and broader than the problems which are immediately confronting the decision-makers. Otherwise, it would not be able to suggest new directions in which the solutions to presently unsolvable problems can be found. Because companies conduct research and development independently, they are able to increase greatly the breadth and depth of the technology base. Independence is a vital factor in assuring successful and efficient performance of research and development, and it gives companies the ability to react promptly in order to expand, curtail, or redirect efforts in response to technological discoveries, market demands and economic forces.

For people to be effective supporters and managers of science and technology, it is essential that they understand innovation. They must understand that it is a chain of events that stretches from an idea to a socially valuable reality.

There is the "rational view" of innovation which sees it as being similar to other major functions of an organization, such as marketing or production, and considers it as a manageable process in which risks are controlled by mechanisms of justification and review. Implicit in this view is the notion that skilled men can anticipate and control the risks of innovation. By a process of justification, decision, and optimization, it is assumed that risk of innovation can be kept within bounds.

Risk is associated with probability, wherein it lends itself to quantitative expression. In the framework of cost-benefit analysis, the risk of an innovation is measured by the known probabilities of the alternative possible outcomes of a project. The benefits of the project can

then be expressed as an expected value, computed by multiplying the probability of each outcome by its payoff (gain or loss) and then summing these products.

Uncertainty is quite another matter, in that a situation is uncertain when it requires action but resists analysis of risks. For example, a gambler takes a risk in an honest game of blackjack when, knowing the odds, he calls for another card. But the same gambler, unsure of the odds or unsure of the honesty of the game, is in a situation of uncertainty.

Men involved in technical innovation in a corporation confront a situation in which the need for action is clear but in which it is by no means clear what to do. The corporation is not designed for uncertainty -- where there are no clear objectives to reach, no measures of accomplishment, or where it is not clear what to try to control. A corporation cannot operate effectively in uncertainty, but is well equipped to handle risk. Accordingly, the innovative work of a corporation consists in converting uncertainty to risk [Allison, 1969, p. 120].

Research and development may be characterized as the discovery and application of innovative approaches to the solution of problems. The ultimate goal may be a new or improved military system, a new approach to housing or transportation, or a new approach to social or health problems. In any case, research and development is expected to lead to innovative ideas.

C. THE RESEARCH AND DEVELOPMENT PERFORMER

To produce innovative ideas and to carry them through to the point where it is possible to evaluate whether further work is justified, researchers must have a source of support which permits some truly independent

research and development. For research workers outside the Federal establishment, this takes the form of independent research and development funds.

Who is the research and development performer? Psychiatrist Lawrence S. Kubie identifies this creative person as possessing unique characteristics [Allison, 1969, p. 9]:

The scientist and the engineer must first of all maintain mastery of an enormous body of rapidly growing data, yet, at the same time, must be as freely imaginative as the poet, the artist, or the musician.

He must also possess the capacity to direct his imaginative flights to real goals, to test the degree to which they are consonant with the real world, and, finally, to project them into the future for new uses.

There is no simple way to describe the very complex process by which ideas are caused to occur and develop. Examining possible thought processes of a research and development performer is useful in order to get a feeling for how ideas become solutions to perceived needs.

For anything that will ever be seen as a new gadget, there have probably been a million other good ideas. The huge majority of ideas exist for only a short period of time -- about one to two seconds. If the brain that had the idea is able to connect it to a problem, it will last for about ten seconds. In that lifetime, the brain has to be able to guess what the cost and benefit will be for the idea. If the brain is able to get past this milestone, the idea will have about one hour of life. During that time, if the brain with the idea is able to fulfill the basic need of talking about it with a peer who is imaginative and respected by the brain which had the idea, then the idea should live for at least a few weeks. If, during that time, the idea is considered again, it should survive for an unlimited time. Having survived, the idea has about a 50 percent chance of being written down and becoming a proposal [Lawson interview, June 1973].

In the industrial environment, concern for costs in relation to benefits, or relevance, is of major importance. James Fisk, president of Bell Telephone Laboratories, states [Allison, 1969, p. 20]:

Among a thousand scientific problems, a hundred or so will be interesting, but only one or two will be truly rewarding -- both to the world of science and to us. What we try to provide is the atmosphere that will make selecting the one or two in a thousand a matter of individual responsibility and essentially automatic.

The greatest capability that the industrial laboratory possesses is the ability to exploit knowledge. There are four requirements for such exploitation: (i) talent -- in sufficient numbers and of sufficient disciplinary diversity to attack a broad spectrum of problems; (ii) an intimacy with the world of science; (iii) scientific sophistication -- a sense of what is intellectually promising and what should be explored; and (iv) the ability to recognize and generate relevant advances in science and to be able to bring together the various talents of scientists and engineers who will carry the advance through research, development, manufacture, and finally to market. This fourth requirement belongs mostly to industry [Allison, 1969, p. 22].

A study by the National Academy of Sciences stated [Allison, 1969, p. 113]:

In examining examples of successful translation of science into technology, one is struck by the diversity of successful patterns and organizational structures. There are no simple formulas for success, and for this reason success is most likely when laboratory management has wide latitude in adapting and restructuring the organization to suit the particular problem areas or technologies with which it currently is dealing.

A second National Academy of Sciences study [Allison, 1969, p. 114] found that freedom and success were frequent partners in creating successful ideas. Furthermore, in most circumstances a critical element has been that the research people be able to shift the directions of their work and explore unanticipated but relevant paths and that such shifts be made at

the discretion of the technical people themselves, without waiting for review and approval by top management.

D. THE NEED FOR INDEPENDENT RESEARCH AND DEVELOPMENT

The need for IR&D can be considered from three vantage points: (i) the private companies undertaking the technical effort, (ii) the customers served by the private companies, and (iii) the nation -- its strength, progress, and well-being.

1. Private Companies

Private companies undertake IR&D to help insure their continuing ability to respond to rapid changes in customer needs, in technologies and in market requirements. IR&D is a vital, integral part of the entrepreneural efforts of the company which has a need to:

a. Provide new and improved products and services to serve short- and long-range needs in present areas of business;

b. Realign company resources and efforts to better meet shifts in national priorities and to meet changes in products and services which are required by the Government and other customers;

c. Update the science and technology of the company in order to serve existing and future customers efficiently in the areas of proposing, estimating, and performing research and development;

d. Maintain reasonable stability in the company's total workload in order to minimize overhead charges and costly disruptive effects upon the company and its employees, customers and others;

e. Achieve a competitive level of awareness of new knowledge in chosen fields of technical activity in order to remain in a business which depends heavily on technical innovation.

2. Customers of Private Industry

Customers of private industry must consider both the short- and long-range needs and objectives with respect to the availability of competent research and development. Specifically, the Department of Defense (DOD), as well as other Government procuring agencies, must plan for research and development in order to allocate resources efficiently for a given technology as well as to advance technology.

Technological progress in the field of national security depends mainly upon the success of research and development activities sponsored by the military services and such closely related agencies of government as the Atomic Energy Commission and the National Aeronautics and Space Administration. It is the nature of research that the researcher does not know what he will discover. Hence, useful ideas can come from unsponsored research in the universities, private industrial laboratories, and individual military and civilian inventors.

There can be no question concerning the crucial importance of promoting military technology in the nuclear era. This importance is emphasized by figure 1 [Senate Armed Services Committee, Part 2, 1972, p. 835] which indicates the resource allocation effort for military research, development, test and evaluation by Russia in comparison with that of the United States. Any power that lags significantly in military technology, no matter how large its military budget or how efficiently it allocates resources, is likely to be at the mercy of a more progressive enemy. Keeping ahead in the technological race is not in itself a guarantee of security in these circumstances; it remains essential to incorporate the technology in operational weapons and to deploy them and use them with skill and intelligence. But no amount of production, skill, and intelligent use can compensate for significant technological inferiority.

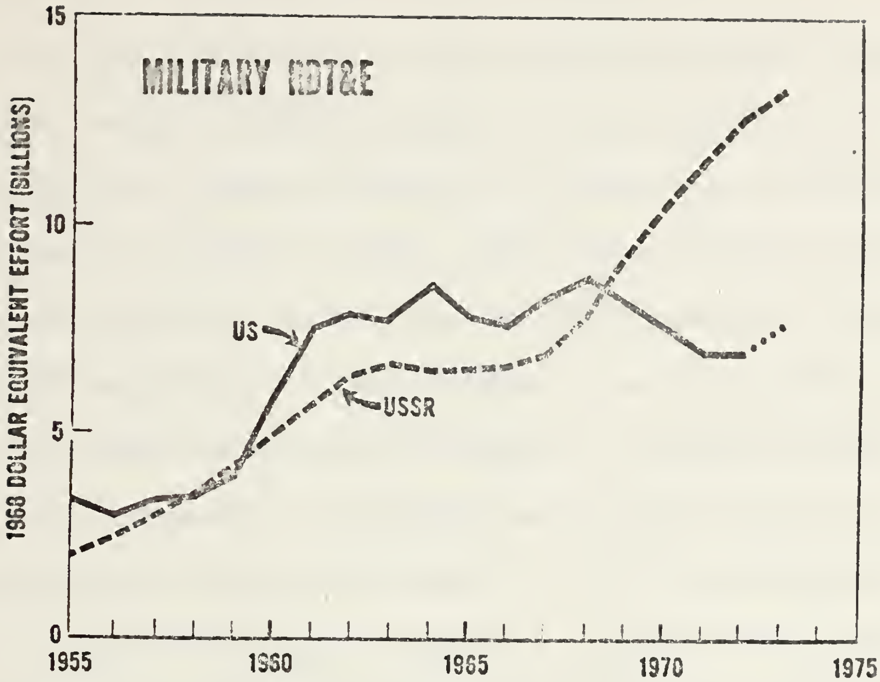

Figure 1.

Source: Senate Armed Services Committee

Dr. John S. Foster, Jr., Director of Defense Research and Engineering, has indicated [Senate Armed Services Committee, Part 1, 1970, p. 357] that research and development are essential to a prudent national security effort because of the following factors:

a. Research and development provide a qualitative advantage required to compensate for any numerical inferiority that the United States has or might suffer in troops or equipment and for any temporary disadvantage it might suffer should a numerically superior force take the initiative. If the United States can maintain its technical leadership, it can achieve its goals -- sometimes at lower costs -- without necessarily competing with the Soviet Union in total numbers of missiles or bombers or troops. Thus, the quality of the United States' deterrent may be more

critical than its quantity. Without research and development there cannot be the essential quality, now or in the future.

b. Knowledge creates options which the President may need during a period of tension, during planning, or during negotiations. It is much safer to know what might be feasible in weapons than to guess what a potential enemy is capable of doing. This option creating function is important also because it permits the Defense Department to respond more rapidly and effectively to large changes in national security policy, when such changes are caused by increased or decreased tension. The United States can be prepared to substitute new equipment for old if it will improve the effectiveness of its forces -- or of an arms-control agreement.

c. The nation needs as broad as possible a conceptual basis of the arms race. It needs to act intelligently on national security, including arms control, by considering the broadest possible range of technological possibilities. To cut the research and development program today is, in effect, to claim great precision in predicting the nature of the world in five to twenty years and to foreclose on the option of the nation's future leaders who will have the responsibility for our national security at that time. An honest attempt should be made to cut the costs of the overall defense burden and to negotiate acceptable treaties limiting weapons, but the country's leaders should not mortgage the future by dismissing or misjudging the critical and growing need for defense research and development.

The nation needs a sound technology base in order to solve, by technical means and on a short time scale, urgent problems encountered by the armed forces. It needs to be able to evaluate new defense concepts and to select those of greatest potential value. It needs to advance technology across a broad front of military need. It needs to

provide improvements in the operations of the armed forces which will use resources efficiently and increase personnel effectiveness.

The Defense Department's technological needs are so diverse and today's technology is so sophisticated that DOD cannot alone have the wisdom and ability to judge all technical projects and approaches that may produce beneficial results. IR&D enables the Department of Defense to capitalize on American technological innovation by using the many technical brains in industry. Additionally, IR&D of the contractors may result in reduced costs to the Government because of exploratory work completed before the Government becomes committed to the execution of a formal contract. It also allows the Government to compare different technical approaches when more than one contractor is doing work in one area, so that the best solution for a particular time and prevailing circumstances can be chosen.

3. National Interests

Overall national interests in a technically strong and responsive private industry are needed not only for the changing technologies and requirements for national security but also for approaches to national problems such as (i) an unfavorable international balance of trade and the consequent need for increased productivity and (ii) population growth with the corollary problems of energy, pollution, housing, and transportation.

It is emphasized here that the Department of Defense should not (and does not) address the nation's needs for a strong technical base by providing extra or abnormal allowances for a company's technical efforts. However, by Government recognizing IR&D as a normal and necessary part of a company doing business, the national interests, as well as the general vitality and usefulness of industry, are served.

a. Research and Development, Productivity, and International Trade

Productivity refers to a comparison between the quantity of goods or services produced and the quantity of resources employed in producing these goods and services. Attention has been directed by former Secretary of Commerce Maurice Stans [Stans, 1971, pp. 8-9] to the United States' present predicament with respect to productivity by taking an historical look at the relative productivity growth rates of various countries. Table I reflects this comparison.

TABLE I.

AVERAGE ANNUAL PRODUCTIVITY GROWTH RATE
IN THREE PERIODS, 1870-1969

	1870-1950	1950-1965	1965-1969
United States	2.4%	2.6%	1.7%
Europe*	1.5%	4.0%	4.5%
Japan	1.4%	6.8%	10.6%

* Italy, Germany, France, Belgium, Netherlands, and U.K.

Source: Maurice Stans

From 1870 to 1950 the United States' rate of productivity growth exceeded Europe's by 60 percent and Japan's by 70 percent. Starting in 1950 the situation was reversed and United States' productivity growth now lags well behind Europe and Japan. From 1950 to 1965, the United States' productivity growth rate trailed Europe's by 35 percent and Japan's by 60 percent. The trend since 1965 shows an even more rapid relative decline. United States' rate trailed Europe by 60 percent and Japan by 84 percent. These differentials in rates result from unprecedented levels of productivity growth in Europe and especially in Japan and from declines in United States' productivity growth.

The President's Task Force on Science Policy has issued a report which states [Commission on Government Procurement, Vol. 2, 1972, p. 59]:

Economic growth will, over a long period of time, define the total level of resources within which our national goals must be achieved. Because of the central significance of economic growth to all other national goals, it is especially important to point out its dependence on science and technology.

If a major national goal is increasing the quality of life for the mass of the population, it becomes essential that continued technological development also be a high priority national goal. Technology growth has a significant effect on continued economic growth and on continuing increases in the productivity of individual companies, whole industries, and the overall national economy.

The overall United States' balance of trade in recent years deteriorated from surpluses of five to seven billion dollars in the early 1960's to levels of one to two billion dollars since 1967. In 1971, the trade surplus disappeared completely and was replaced by a deficit of one-and-a-half billion dollars. This was the first trade deficit since 1893 [Stans, 1971, p. 6].

To analyze trade problems and identify relationships between technology growth and United States trade balances, the overall balance of trade can be broken into various categories: (i) agricultural products; (ii) raw material (minerals, oil, etc.); (iii) low-technology manufactures (textiles, iron and steel, footwear); and (iv) high-technology manufactures (computers, automotive products, aircraft and other transportation equipment, chemicals, machinery, scientific and professional instruments). Figures 2, 3, 4, and 5 show trends in the differential between imports and exports for these categories [Commission on Government

TRADE IN AGRICULTURAL PRODUCTS

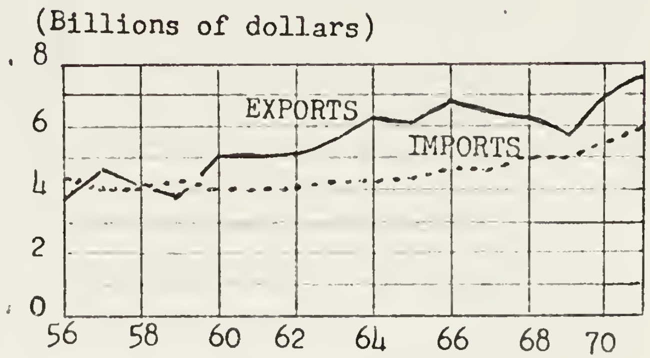

FIGURE 2

TRADE IN RAW MATERIALS

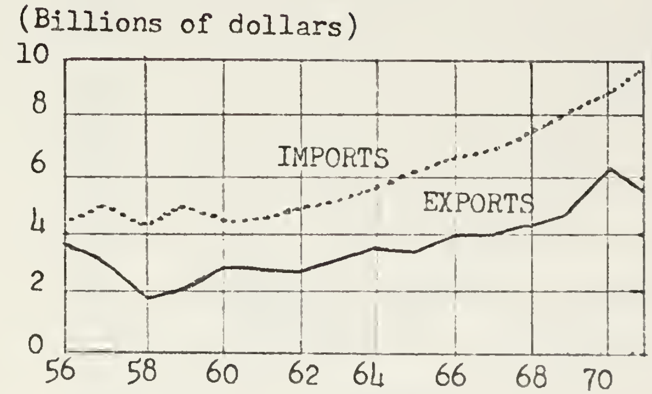

FIGURE 3

Source: Commission on Government Procurement

TRADE IN LOW - TECHNOLOGY MANUFACTURES

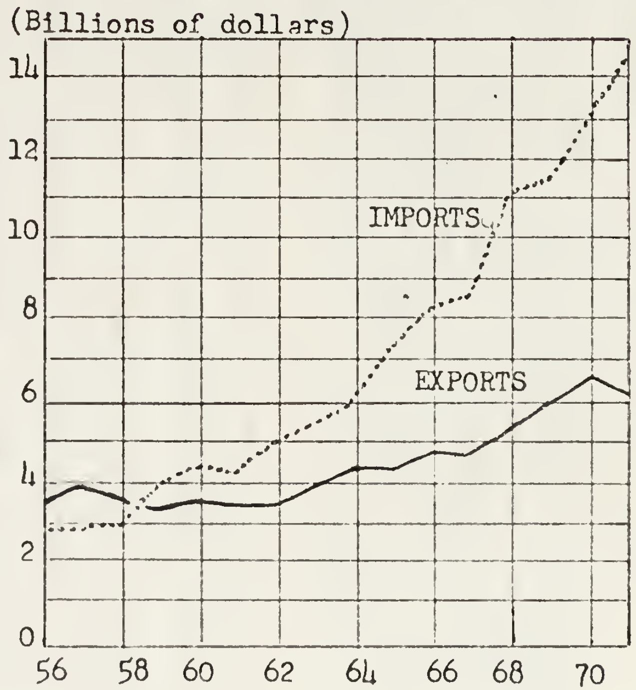

FIGURE 4

TRADE IN HIGH - TECHNOLOGY MANUFACTURES

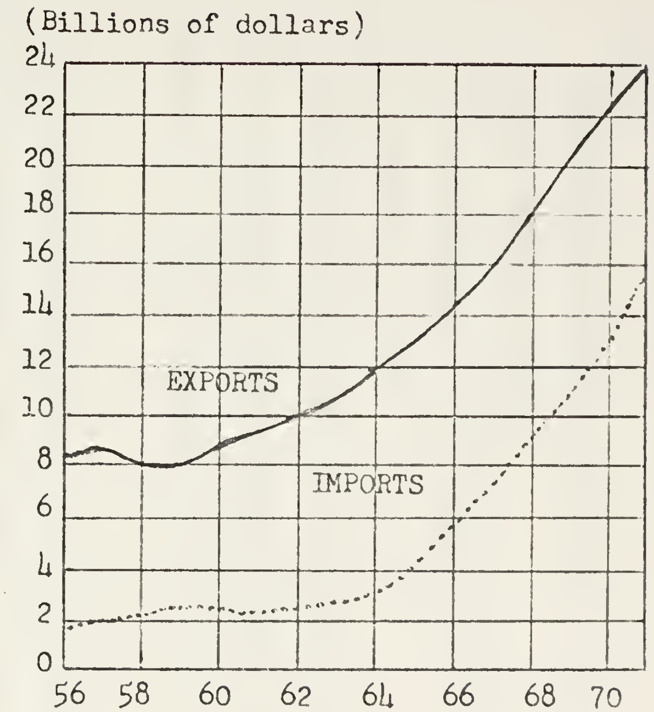

FIGURE 5

Source: Commission on Government Procurement

Procurement, Vol. 2, 1972, p. 61]. The following points can be made concerning the figures:

(1) Agricultural products have shown a fluctuating surplus of between one and two billion dollars.

(2) Raw materials have had a large and persistent deficit, increasing to $4.1 billion in 1971.

(3) The major trade losses have occurred in low-technology products. They had a $1.8 billion average annual surplus from 1951 to 1955. This has changed to an ever-increasing deficit which reached $8.3 billion in 1971.

(4) The increasing deficits in raw materials and low-technology products have been off-set in the past by sizeable and stable surpluses in high-technology products. However, a surplus of $9.6 billion in 1970 was reduced substantially to $8.3 billion in 1971.

Dr. Frederick Scherer, economist at the University of Michigan, has emphasized the importance of technology evolution to the nation [Commission on Government Procurement, 1972, p. 62]:

> The export strength of this country has always been in areas of high technology. Traditionally this country leads areas of new technology for a while. The second stage normally sees U.S. firms establish subsidiaries overseas to take advantage of lower labor costs. The third stage is imitation by indigenous entrepreneurs. It is a regular cycle which <u>must</u> be revitalized periodically by us taking the lead in new areas of technology or this country may become the Britain of 1980. Since the Government is the principal supporter of research, it has an obligation to plan sensibly to retain our lead.

An additional factor can be seen from Table II [Stans, 1971, Chart 10], which indicates that the United States' cost of labor is greater than all other countries by a substantial margin. If foreign competitors can just approach the technology of the United States, they can be significantly effective in competing because of their much lower labor costs.

TABLE II.

INDEXES OF COMPARATIVE LABOR COST IN MANUFACTURING
(includes fringe benefits)

	1960	1965	1970
United States	100	100	100
Japan	11	16	26
United Kingdom	32	36	37
France	30	37	39
West Germany	32	45	54
Canada	82	72	83

Source: Maurice Stans

If the United States is to continue to enjoy the current level of compensation benefits for its people, it must maintain its counterbalancing productivity advantage, which means that it must maintain a substantially superior technological position. In order to do this a fundamental fact must be remembered: the main sources of increase in the productivity of labor are, by far, actions by individuals in pursuit of their private interests. They seek ways to increase the efficiency with which their labor and capital are used in order to get more for themselves.

Concerned individuals may wonder if a greater appropriation of funds for research and development actually results in greater technological growth and subsequent increased productivity. Because factors other than R&D, such as investment and education, contribute to economic growth and productivity, it is difficult to quantify the relationship. However, the relationship has been examined for groups of firms, whole industries, and the nation. Positive and significant correlation has been found between R&D effort financed either by industry or the Government

and the rate of productivity growth. Some of the findings are described below:

a. Nestor E. Terleckyj, in a study of twenty industries, found that the industries with a high ratio of research expenditures to sales had not only higher rates of productivity gain, but higher rates of growth and a higher proportion of their sales from new or substantially changed products not in existence four years earlier. He found that there was a 0.7 percent increase in the rate of productivity increase associated with each 1.0 percent increase in the growth rate of R&D expenditures. He also found that the rate of growth of industry productivity increased by 0.5 percent for each tenfold increase in the ratio of R&D expenditures to sales [Terleckyj, 1960, p. 64].

b. In a study of seventeen chemical firms for the period 1948-1957, a gross return of 54 percent on investment in R&D was discovered [Minasian, 1962].

c. Edwin Mansfield, during an examination of ten petroleum firms, found an average of 40 to 60 percent marginal rates of return on R&D investment. He found between 7 and 30 percent for ten chemical firms, the variation being due to differing assumptions used. In a study of food, apparel, and furniture, he found that for each 1.0 percent increase in the rate of growth of R&D expenditures, there was a 0.1 to 0.7 percent growth in productivity. Again, the variation depended on the assumptions used. However, it was felt that the assumptions underlying the larger values were closer to reality [Mansfield, 1968, p. 20].

d. A study of twenty-four manufacturing industries estimated that, on the average, productivity was raised 1.3 percent anually for an industry that conducted R&D. The study further estimated that the average annual productivity increased another 1.1 percent because of R&D

conducted by industries supplying the inputs. Of the twenty-four industries examined, the direct and indirect R&D effort accounted for more than half the average productivity gain of 4.5 percent a year [Raines, 1968, Working Paper No. 6814].

e. A Russian economist found that United States' expenditures for R&D were several times more effective in increasing output than the same amount spent on fixed capital. For the period 1951-1966, an incremental dollar spent on R&D was associated with an increase of $2.39 in output, assuming a five-year lag between R&D expenditures and associated increases in output, and $4.36 if a ten-year lag was assumed. Conversely, the increase in output associated with investment in fixed capital was only $0.35 [Komzin, 1970, pp. 115-117].

f. Productivity in selected industries for the period 1960 to 1971 is indicated in figure 6 [Zimmerman, Cost Engineering, April 1973, pp. 18-19]. The figure shows productivity growth and indexes based on output per total number of employees. It demonstrates that productivity increases in some industries were negligible and in others were remarkably high. Interestingly, the industries with the greatest productivity increases were also those that generally have invested more in research and development.

$\frac{2.39}{.35} = \frac{7}{1}$ $\frac{4.36}{.35} = \frac{13}{1}$

PRODUCTIVITY IN SELECTED INDUSTRIES

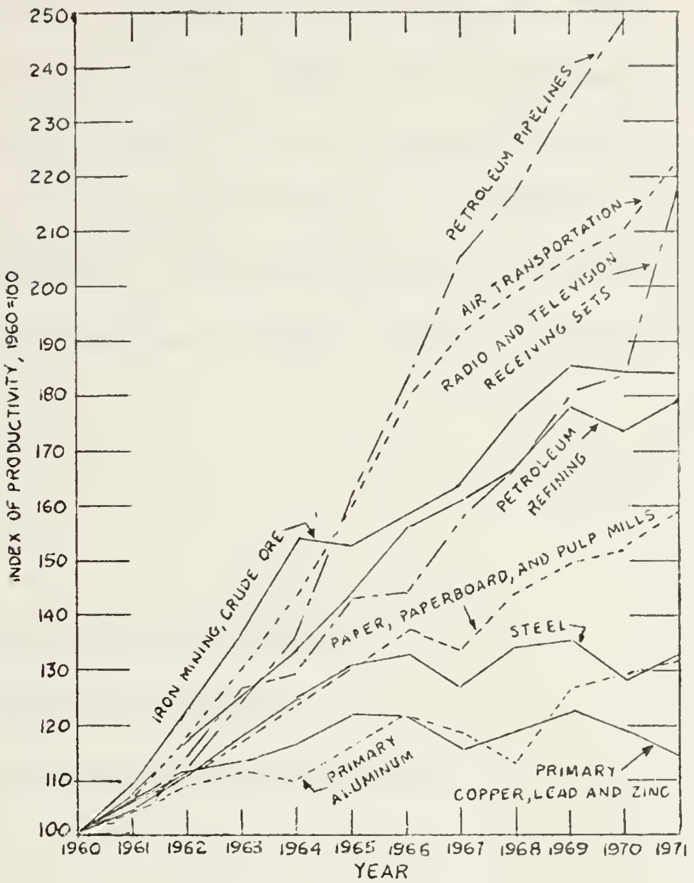

FIGURE 6.

Source: Cost Engineering

b. Population Growth

There is a critical need to accept and to plan for continued, substantial population growth. Robert S. McNamara, president of the World Bank, stated [McNamara address to World Bank Board of Governors, 25 Sep 1972]:

While the population problem is clearly one which cannot be solved within the confines of a five-year plan, or a development decade, or indeed even during what is left of our century, it is by its very nature a problem that can grow only worse with procrastination and delay. That is why we believe the entire international community must assign it the highest priority.

The world's population currently is increasing at about 2 percent annually, doubling every thirty-five years. As is indicated by figure 7 [United Nations, 1970], this growth rate is unprecedented. It took two million years for man's numbers to reach one billion, one hundred years for the second billion, and successive billions continue to come even faster. At the present rate of increase, the sixth billion will require less than a decade. Figure 8 [United Nations, 1970]

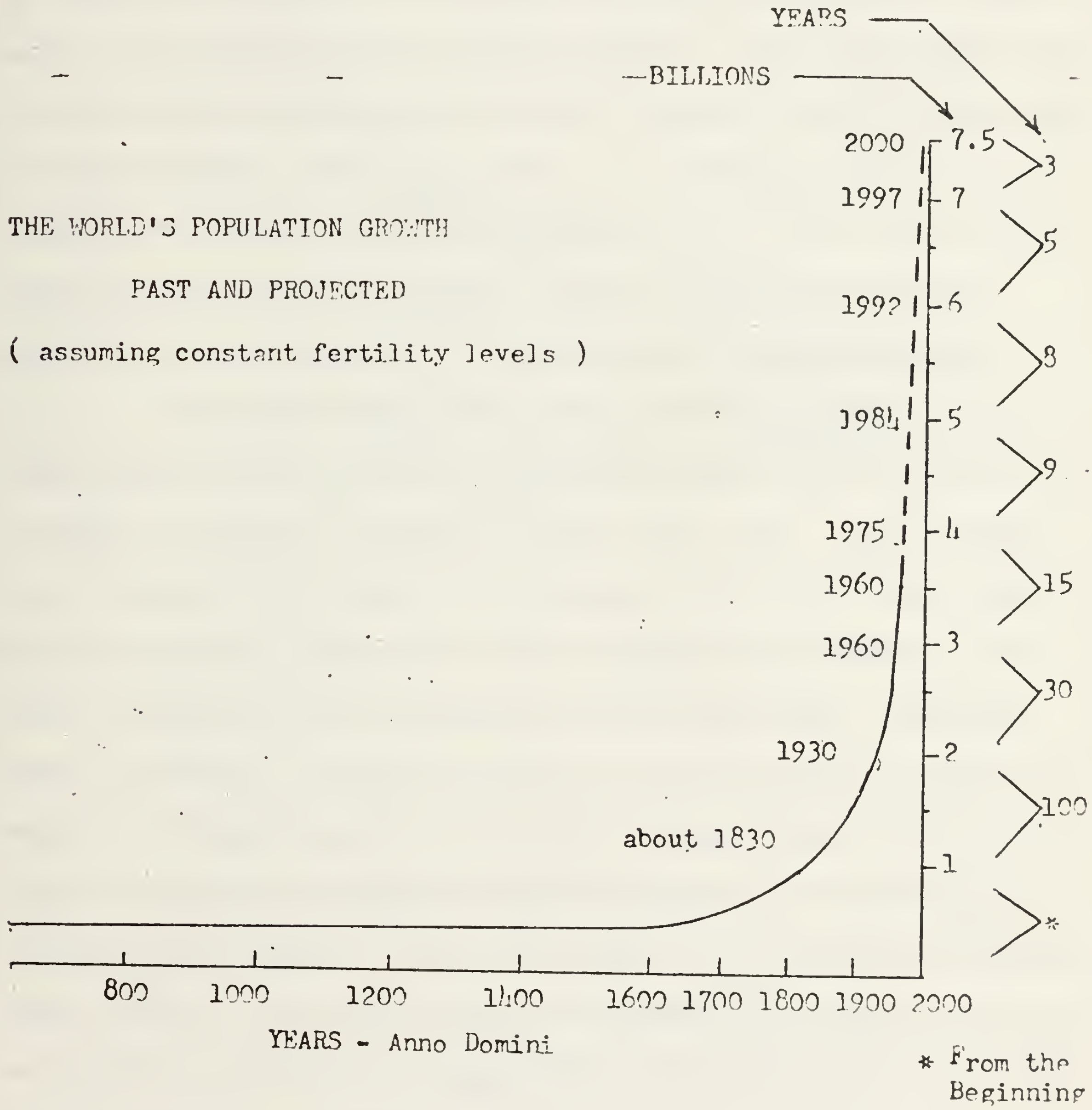

FIGURE 7

Source: United Nations Basic Data

illustrates the geographical distribution of the population growth and the fact that the United States and other developed countries represent the minority of the population ratio, which is currently 30:70 between developed and underdeveloped countries and is expected to swing unrelentingly to 20:80 and perhaps to 10:90 by the year 2050 [Frejka, Scientific American, Vol. 228, No. 3, March 1973].

Population is growing rapidly because man has succeeded, to an unprecedented degree, in controlling disease and feeding the world's people. More babies survive to become parents. But while the death rate has been reduced, nations have been slow to reduce their high birth rates so that population would remain stable. The consequence is that uncontrolled human fertility may pose a greater threat to man's future well-being than any other single factor. Slowing population growth is a prerequisite to solving many of mankind's most pressing problems.

Continuing population growth is steadily reducing the per capita global supply of living space, fresh water, forest products, industrial raw materials, energy fuels and arable land. It is causing a sharp increase in the number of new entrants into the job market and resultant increasing unemployment in the underdeveloped countries; this leads to declining living standards, poverty, and misery. Population growth is causing a widening gap between the rich and poor nations with respect to the distribution of the world's wealth; this is likely to increase violence as the depressed people may resort to desperate means of redressing the imbalance of power and wealth. It is causing an increased social crisis, as the world's people are becoming more urban and less rural; this is resulting in the deprivation of the basic amenities of life for large quantities of people.

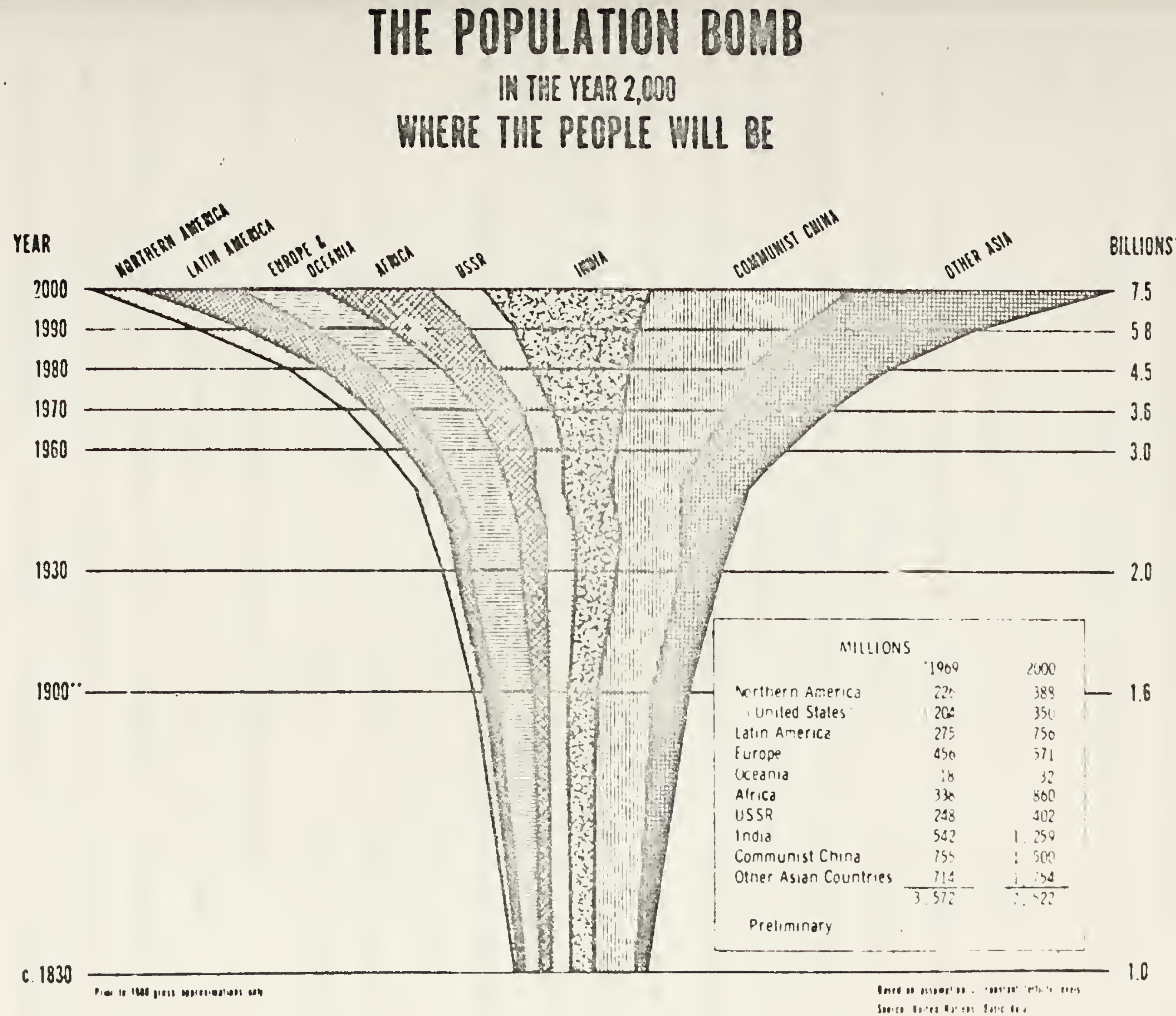

FIGURE 8

Source: United Nations Basic Data

The world's natural environment is steadily deteriorating as a habitat for living things, including man. The atmosphere of airs and climates, the hydrosphere of rivers, lakes, and oceans, the lithosphere from which rock has crumbled away over the millennia to give us our thin and fragile envelope of soil -- all are being polluted at an ever-increasing rate.

The world economy will not have enough air, water, space and amenity left for its increasing number of people unless a more modest attitude is adopted for purely material demands. It is imperative that the developed countries invent forms of consumption and enjoyment that make fewer claims on a limited biosphere. The biosphere is the only one in existence and it will be required to support four billion additional people by the year 2000. With the population ever increasing, resources growing more expensive, technologies becoming more complicated, and human aspirations rising in all societies, there is little time in which to make the more responsible choices and better environmental judgments.

To maintain the same standard of living for its people a country must double its output of goods and services (gross national product) in the same time that population doubles. To improve standards of living it must more than double its gross national product.

In the cities and on the land, only a massive and increasing investment of capital and skill can give governments and peoples time to evolve the kind of modernized, technological, and high-productivity society that is so essential. In order to accomplish this, a synergistic effort on the part of individuals, institutions, industry and government, is required. A company's independent research and development effort, as well as the Government's specific research and development projects, can

assist in reaching a better world order by alleviating some of the strain caused by the population explosion.

> Alone in space, alone in its life-supporting systems, powered by inconceivable energies, mediating them to us through the most delicate adjustments, wayward, unlikely, unpredictable, but nourishing, enlivening, and enriching in the largest degree -- is this not a precious home for all of us earthlings? Is it not worth our love? Does it not deserve all the inventiveness and courage and generosity of which we are capable to preserve it from degradation and destruction and, by doing so, to secure our own survival [Ward & Dubos, 1972, p. 220]?

II. HISTORY

In 1776, the new nation of the United States of America had natural resources in abundance. Means for exploiting them were very limited. National security objectives were very modest, namely, to avoid foreign entanglements, to defend the land frontiers against the Indians and the neighbors in Canada and Florida, and to maintain internal security. Of these three, defense against the Indians appeared to many to be the most important. For this purpose, a small military establishment was considered sufficient. To manage this small establishment, a War Department was created. In the very first year the military establishment consisted only of ground forces -- an Army of 46 officers and 672 men [Hitch, 1965, p. 5]. Cost principles in support of these forces were not considered to merit a high priority.

In 1793, due to depredations inflicted on American shipping by the Barbary pirated as well as by French Republican privateers, President George Washington appealed for a condition of complete defense, stating [Hitch, 1965, p. 6]:

> If we desire to avoid insult, we must be able to repel it; If we desire to secure peace, it must be known that we are at all times ready for war.

To make this condition a reality, the Congress, in March 1794, authorized the building of six frigates to form the backbone of a new, seagoing United States Navy. Six private yards, so selected as to spread the work among the states as equitably as possible and with greatest political advantage, were leased. Due to complications, the six keels were finally laid at the end of 1795. However, shortly thereafter, partly as a result of mismanagement, delays, and cost overruns, the program was cut

back to three frigates [Hitch, 1965, p. 6]. This was one of the nation's first cases that indicated a need for cost principles.

A. HISTORY OF COST PRINCIPLES

The provisions of Article I, Section 8, of the Constitution empower the Congress to enact procurement laws. In 1795, the Congress enacted the Purveyor of Public Supplies Act [1 Stat. 419 (1795)], which became the basis for procuring and providing all supplies required for the United States military.

The Civil Sundry Appropriations Act was enacted in 1861 [12 Stat. 220 (1861)]. In order to elicit a fair price by means of competition in the market place, it specified that all purchases and contracts for supplies and services by a department of the Government, except for personal services, would be made by advertising, provided that public exigency did not require immediate delivery or performance. Subsequently, the courts, the Attorney General and the Comptroller General ruled that, where the existence of only one source made competition impracticable, advertising was not required.

During the Civil War, in large part due to public exigency, there were no statutes to regulate profiteering. Contractors reaped unconscionable profits on military procurement and had little reason to hide these profits.

During World War I, the Government acted to limit defense profits. It used cost-plus-a-percentage-of-cost contracts that made necessary a determination of allowable costs as a part of their administration. Cost-plus-a-percentage-of-cost limited the percentage of profit that could be earned but did not curb the amount of profit. Contractors simply inflated costs with a result of increased profits.

Excess profit taxes were established during the war, but they were only partially effective. These taxes did not apply if a contractor could show that his profits, no matter how high they might be, were not appreciably higher than his average pre-war profits. Thus, how industry accounted for costs became a significant factor.

Legislation enacted between World War I and World War II did not reflect an appreciation of the basic deficiencies inherent in the prior years' experience. The Vinson-Trammell Act of 1934 [48 Stat. 503 (1934)] and the Merchant Marine Act of 1936 [49 Stat. 1985 (1936)] applied only to contracts for naval vessels and aircraft and merely required payment to the Treasury of profits earned in excess of a fixed percentage of the contract price. Hence, contractors drove up costs and thus increased their total profit. Further, a profit of ten percent of costs could result in exorbitant profits from a return-on-investment standpoint.

On 7 August 1940, the Commissioner of Internal Revenue, with the approval of the Secretaries of the Treasury, War and Navy Departments, promulgated Treasury Decision 5000 [Treasury Decision 5000, 1940] under Section 2(b) of the Act of 28 June 1940 [54 Stat. 676 (1940)], as a guide for recapturing excess profits on contracts for vessels and aircraft. It included cost principles to determine allowability of costs for cost-reimbursement type contracts. This marked the first time that independent technical effort was recognized as an allowable cost. Independent technical effort was largely devoted to product development rather than to research, as is evidenced by the following Treasury Decision 5000 provision for cost- and fixed-price contracts:

> Other manufacturing costs as used in paragraph (b) of this section includes ... 'deferred' or 'unliquidated' experimental and development charges. For example, in case experimental and development costs have been properly deferred or capitalized and are amortized in accordance

with a reasonably consistent plan, a proper portion of the current charge, determined by a ratable allocation which is reasonable in consideration of the pertinent facts, may be treated as a cost of performing the contract or subcontract. In the case of general experimental and development expenses which may be charged off currently, a reasonable portion thereof may be allocated to the cost of performing the contract or subcontract. If a special experimental or development project is carried on in pursuance of a contract, or in anticipation of a contract which is later entered into, and the expense is not treated as a part of general experimental and development expenses or is not otherwise allowed as a cost of performing the contract, there clearly appearing no reasonable prospect of an additional contract for the type of article involved, the entire cost of such project may be allowed as a part of the cost of performing the contract.

Bidding costs were also addressed [Treasury Decision 5000, 1940]:

Bidding and general selling expenses which by reference to all the pertinent facts and circumstances reasonably constitute a part of the cost of performing a contract or subcontract (are allowable). The treatment of bidding and general selling expenses as a part of general expenses in accordance with this paragraph is in lieu of any direct charges which might otherwise be made for such expenses. The term 'bidding expenses' as used in this section includes all expenses in connection with preparing and submitting bids.

The provisions of the law upon which Treasury Decision 5000 was based (Vinson-Trammell Act) were suspended by the Second Revenue Act of 1940 [54 Stat. 974 (1940)] but many contracts entered into after that date included Section 26.9 by reference or direct quotation for the specific purpose of defining reimbursable costs. Treasury Decision 5000 has substantial historical significance in that it is generally considered the forerunner and basis for all regulations relating to the determination of costs under Department of Defense contracts.

Practical explanation and elaboration of Treasury Decision 5000 occurred in April 1942, when the War Department and Navy Department jointly issued a thin pamphlet with a soft green cover entitled "Explanation of Principles for Determination of Costs Under Government Contracts." This pamphlet went on to a long life of fame as the "Green Book," which became the recognized basis and authority for cost determination, as it provided the philosophy for allowable costs in Government contracts.

The National Security Act of 1947, as amended in 1949, established the Department of Defense [63 Stat. 578 (1949)]. A companion piece of legislation -- the Armed Services Procurement Act of 1947 [62 Stat. 21 (1947)] -- led to the issuance of the Armed Services Procurement Regulation (ASPR) which implemented the act [ASPR, 1949]. The ASPR included as Section XV a set of cost principles, the use of which was mandatory in all cost-type contracts entered into on and after 1 March 1949. Section XV replaced Treasury Decision 5000's cost principles. It allowed independent development but did not allow independent research unless specifically provided for in the contract. This restriction was often circumvented by adding a clause to contracts authorizing reimbursement of research costs. In some cases, separate agreements for IR&D were negotiated and applied across the board to all Government contracts received by a given contractor. B&P expenses were generally accepted; the cost principles recognized the allowability of selling and distribution expenses incurred in connection with marketing the contractor's products.

The decade following publication of ASPR (1949) Section XV was characterized by considerable criticism of the cost principles therein and by a number of significant attempts to correct the situation. The solutions followed a general pattern -- complete rewrite of a new Section XV practically on an annual basis.

Comprehensive cost principles were finally adopted in November 1959. This complete revision, effective on 1 July 1960, provided that the cost principles would be used as a guide for fixed-price type contracts. These cost principles introduced the test of reasonableness and allocability in passing on the allowability of contract costs. They defined "research" and "development" and treated them separately. Independent research costs

were generally allowable if allocated to all the contractor's business, and development costs were allowable if directly related to those product lines for which the Government had contracts. The 1959 ASPR considered advance agreements between the contractor and the Government to be important in determining the amount of such costs that the Government would recognize. Guidelines for technical evaluation of these costs were stated in a DOD instruction entitled "Uniform Negotiation for Reimbursement of Independent Research and Development Costs" [DOD Inst. 4105.52, 28 June 1960].

During the 1960's many problems arose regarding the 1959 cost principles. There was concern over the separation of "research" and "development," differentiation between IR&D and B&P, technical evaluation associated with advance agreement negotiations, and also the application of overhead to IR&D and B&P.

In the early 1960's a DOD Task Group, under the leadership of the Office of Director of Defense Research and Engineering (ODDR&E), was organized to address the problems resulting from the 1959 cost principles [LMI Report on CITE Reimbursement policies, Aug 1966]. The major recommendation of this Task Group was to identify IR&D, B&P and something called "Other Technical Effort (OTE)" -- considered to consist of indirect technical efforts which were essentially in the nature of IR&D and B&P but not identified as such in the accounting records -- collectively as "Contractor Independent Technical Effort (CITE)." It was intended to lump all of these costs into one pool and to have a proposed procedure to achieve a negotiated ceiling. The planned first step was to modify the cost principles in order to combine IR&D and B&P into CITE, to improve the definitions, and to establish a policy of applying overhead to

CITE. This effort was to be followed by a determination of reasonableness, which would have considered "Contractor Weighted Average Share in Cost Risk (CWAS)"[1] and the development of industry norms. The Task Group effort continued until late 1966 when the Secretary of Defense terminated it on the basis that IR&D and B&P were generated for different purposes and should be treated separately.

The Office of Assistant Secretary of Defense for Installations and Logistics (OASDI&L) then assumed responsibility and initiated plans to revise the cost principles. This effort culminated in revisions to ASPR in 1969, which revisions placed tighter controls over the separation of IR&D and B&P, utilized the CWAS concept, and provided a formula technique for contracts not using that concept.

The fiscal year 1970 defense procurement funds were subjected to a most careful legislative examination by the Congress. Senator William Proxmire of Wisconsin conducted a direct assault on IR&D. In the course of consideration of the Defense Procurement Authorization Act for 1970, the Senator proclaimed alarm at the escalation of these costs [See Table III later in this chapter] and suggested sharp restrictions on the availability of appropriated funds to reimburse contractors for allocable shares of IR&D, B&P, and OTE expense. The result was the adoption by the Senate on 16 September 1969 of an amendment to the authorization bill which would have placed a dollar limit on such expenditures in the amount of $468 million, a sum considered to represent a reduction of approximately twenty percent in the prior year's spending figure for that purpose.

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[1]CWAS is a procedure for recognizing contractors who bear large shares of the risks involved in their costs and exempting them from certain audits. If a contractor can achieve a CWAS rating, certain of the selected items of cost which he incurs will be presumed to be reasonable because his business is competitive and his decisions incorporate a conscientious consideration of costs.

On 8 October 1969, Senator Proxmire introduced S.3003, embodying his original proposal in this area and banning any payment for IR&D unless such work was determined by the contracting agency to be of direct or indirect benefit to the work being performed under the contract.

Subsequently, the House-Senate Conference on the authorization bill arrived at a compromise agreement, which was enacted as Section 403 of the Military Procurement Authorization Act of 1970 (P.L. 91-121) and stated [83 Stat. 204 (1969)]:

Funds authorized for appropriation under provisions of this Act shall not be available for payment of independent research and development, bid and proposal, and other technical effort costs incurred under contracts entered into subsequent to the effective date of this Act for any amount in excess of 93 per centum of the total amount contemplated for use for such purposes out of funds authorized for procurement and for research, development, test, and evaluation. The foregoing limitation shall not apply in the case of (1) formally advertised contracts, (2) other firmly fixed contracts competitively awarded, or (3) contracts under $100,000.

Extensive hearings on IR&D and B&P were held during the first half of 1970 by the Senate and House Armed Services Committees in relation to the fiscal year 1971 Military Procurement Authorization Bill. Section 203 of the 1971 Act [84 Stat. 904 (1970)] repealed the 93 percent limitation of the 1970 Act but added further restrictions on the allowability of IR&D and B&P costs. It required that: (i) funds authorized for appropriation to DOD not be available for payment of IR&D and B&P unless the Secretary of Defense determined that the work for which payment was to be made had a potential relationship to a military function or operation; (ii) DOD negotiate advance agreements to establish dollar ceilings on such costs with all companies which, during the last preceding year, received more than two million dollars of IR&D or B&P payments from DOD; and (iii) IR&D portions of the negotiated advance agreements be based on company-submitted plans that are technically evaluated by DOD prior to or during the fiscal year covered by the agreement.

Based on this action and the continuing study by DOD, further revisions to the ASPR cost principles were prepared and issued as Defense Procurement Circular (DPC) 90 on 1 September 1971 and went into effect on 1 January 1972 [DPC 90, 1 Sep 1971].

DPC 90 requires that IR&D and B&P costs include all direct and allocable indirect costs except that general and administrative costs are not considered allocable to IR&D and B&P. IR&D and B&P costs are to be allocated to contracts on the same basis as the general and administrative (G&A) expense grouping of the profit center in which such costs are incurred. A separate dollar ceiling is required for IR&D and for B&P. However, a contractor can recover costs for IR&D above the negotiated ceiling, provided that recovery of B&P costs covered by the same agreement is decreased below its ceiling by a like amount, and vice versa. Within ceiling limitations, contractors are not required to share IR&D costs. In negotiating a ceiling, particular attention is to be paid to the technical evaluation and the potential military relationship of the IR&D projects, comparison with previous years' programs, and changes in the company's business activities. Allowable IR&D and B&P costs for companies not required to negotiate advance agreements are established by an historically-based formula.

A new DOD instruction [DOD Inst. 5100.66, 29 Feb. 1972] has superseded DOD Instruction 4105.52. It prescribes the role, mission, and composition of the IR&D Policy Council and assigns responsibilities and outlines procedures for the technical evaluation and review of IR&D programs by the IR&D Technical Evaluation Group.

The IR&D Policy Council is responsible for developing policy and guidance for IR&D and B&P matters. It determines the proper level of DOD support required, outlines IR&D and B&P goals, establishes the mechanisms to

be used to regulate the overall level of effort, provides the necessary guidance to insure valid potential relevancy determinations, determines appropriate negotiation policies, and responds to congressional inquiries.

The IR&D Technical Evaluation Group (formerly the Armed Services Research Specialists Committee) is composed of a chairman appointed by the Director of Defense Research and Engineering and three IR&D departmental managers -- one each from the Army, Navy, and Air Force. It is responsible for establishing criteria and methodology to be used by the military departments for the technical evaluations and ratings of IR&D programs. These evaluations determine the relevance and quality of each project and categorize each project as research or development in accordance with the ASPR definition.

Difficulties continue to be experienced with cost principles for IR&D and B&P. Problems persist in developing and negotiating IR&D and B&P advance agreements. Most agreements are not negotiated before costs are incurred. Negotiation procedures are neither uniform nor consistent. After-the-fact reviews to determine relevancy, especially for B&P efforts, are excessively delayed. Contractors are concerned about what they believe to be a repressive effect of the requirement for a potential military relationship upon highly innovative research and development.

B. HISTORY OF COST ACCOUNTING STANDARDS

Following hearings by the House Banking and Currency Committee in 1968 on a relatively routine bill to extend the Defense Production Act of 1950, a biennial responsibility, the House Committee reported the bill with an unusual amendment. This amendment had its origins in testimony by two witnesses before that committee: Mr. Price Daniel, Director, Office of Emergency Planning, and Vice Admiral H.G. Rickover.

The Admiral's testimony was critical of the manner in which Government procurement was being accomplished, as well as of groups involved, which groups included elements in the DOD, industry, and the accounting profession. His testimony addressed accounting practices with specific statements [Staats, 1969, p. 21]:

1. that "lack of uniform accounting standards is the most serious deficiency in Government procurement today;"

2. that "industry will not establish such standards because it is not to their advantage to do so;"

3. that the accounting profession "has had ample time and opportunity to establish effective standards" but pays "only lip service to the concept;" and

4. that "if uniform accounting standards are ever to be established the initiative will have to come from Congress."

The Admiral indicated that the issue of uniform cost accounting standards was neither new nor revolutionary in that the concept had existed in Continental Europe for years. He found that in the early 1920's, a German professor, Eugene Schmalenbach, was frustrated by his inability to make accurate comparisons of the financial data made available by different companies. The professor's Model Chart of Accounts had laid the foundation for the subsequent development of uniform accounting in Germany and in other European countries.

Admiral Rickover recommended an amendment to the Defense Production Act which would require contractors to account for costs under Government contracts in accordance with uniform accounting standards. He also recommended that the legislation require that defense contractors provide a report of costs and profits for each contract over $100,000.

When the Senate Banking and Currency Committee conducted its hearings in June 1968, various witnesses testified from Government, industry, and the accounting profession; and the Committee received many statements and letters. While a few favored the legislation, at least in part, the overwhelming majority of views expressed by witnesses opposed the legislation.

Following the hearings, the Senate Committee reported the House bill but deleted all language having anything to do with "uniform accounting standards." However, when the bill was debated on the Senate floor, Senatore Proxmire offered a modified amendment designed to accommodate some of the objections raised and recommendations offered during the testimony. Senator Proxmire's amendment was adopted by the Senate, agreed to by the House, and became law on 1 July 1968, as part of Public Law 90-370 [82 Stat. 279 (1968)].

The Proxmire amendment provided that the Comptroller General, in co-operation with the Secretary of Defense and the Director of the Bureau of the Budget, should undertake a study to determine the feasibility of applying uniform cost accounting standards to be used in all negotiated price contract and subcontract defense procurements of $100,000 or more.

After studying the subject, the General Accounting Office (GAO) determined that uniform cost accounting standards were both feasible and necessary to provide a greater degree of uniformity and consistency in cost accounting. Mr. Elmer B. Staats, the Comptroller General, in testimony before the Senate Banking and Currency Committee, states that he believed uniform cost accounting standards would result in a substantial savings of public funds. (Admiral Rickover's estimate of savings was two billion dollars a year.) [Rickover, 1970]

The GAO feasibility study found that ASPR Section XV relied heavily on the conventional practices of contractors [GAO Report of Feasibility

of Cost Accounting Standards, Jan 1970]. In ascertaining what constituted costs, Section XV provided that any generally accepted method of determining or estimating costs could be used that was equitable under the circumstances. Elsewhere, it placed a dependence upon "generally accepted accounting principles." In some areas, Section XV also accepted the accounting methods allowed by the Internal Revenue Service for income tax purposes.

The study found that generally accepted accounting principles, regulations of the Internal Revenue Service, regulations of the Securities and Exchange Commission, and rules adopted by the Renegotiation Board were not adequate for contract costing because they had been designed for different purposes.

The GAO report emphasized that, while the provisions of Section XV of ASPR were intended to provide general cost accounting guidance and procedures for defense contracting, their effectiveness was impaired because: (i) they made frequent references to non-applicable principles and regulations, (ii) they lacked specific criteria for the use of alternative accounting principles and indirect cost allocation methods, and (iii) they were of limited applicability, since they were mandatory for only cost-reimbursement-type contracts.

The report stated that cost accounting standards should apply to negotiated procurement contracts and subcontracts, both cost- and fixed-price, and should be made applicable government-wide. In addition, new machinery should be established for the development of cost accounting standards and these standards should strive to eliminate unnecessary alternative cost accounting practices.

The Comptroller General's report stimulated vigorous debates in both Houses of Congress. This resulted in Public Law 91-379, which was enacted

on 15 August 1970 [84 Stat. 796 (1970)]. This new law added Section 719 to the Defense Production Act and thereby created the Cost Accounting Standards Board as an agent of the Congress and independent of the executive departments of Government. Among other things, the law provided for the following:

1. A Cost Accounting Standards Board was created. It consists of the Comptroller General as chairman, and four members appointed by him -- one representative from industry, one from Government, and two from the accounting profession.

2. The Board is authorized to promulgate cost accounting standards. These standards are intended to achieve uniformity and consistency in the cost accounting principles followed by defense contractors and subcontractors under contracts in excess of $100,000, other than contracts where the price negotiated is based on (i) established catalog or market prices of commercial items sold in substantial quantities to the general public or (ii) prices set by law or regulation. In promulgating such standards, the Board is to consider the probable costs of implementation compared to the probable benefits.

3. The Board is authorized to make regulations which require defense contractors and subcontractors, as a condition of contracting, to disclose in writing their cost accounting principles, including methods of distinguishing direct cost from indirect cost and the basis used for allocating indirect costs. Contractors are required to agree to a contract price adjustment, with interest, for any excess costs paid to the contractors by the United States because of the contractors' failure to comply with duly promulgated cost accounting standards in pricing contract proposals and in accumulating and reporting contract performance cost data.

The first substantive issuances by the Cost Accounting Standards Board became effective 1 July 1972. These include [Cost Accounting Standards Board Progress Report to the Congress, Aug 1972]:

1. A requirement that contractors use a Disclosure Statement to reveal in writing their cost accounting practices and then follow those practices consistently.

2. A Standard on "Consistency in Estimating, Accumulating, and Reporting Costs" designed to insure that each contractor's practices used in estimating costs for a proposal are consistent with cost accounting practices used by it in accumulating and reporting actual costs.

3. A Standard on "Consistency in Allocating Costs Incurred for the Same Purpose" designed to require that all costs incurred for the same purpose and in like circumstances be either direct costs only or indirect costs only.

4. A contract clause implementing the rules, regulations, and Standards promulgated by the Board.

5. A regulation defining various terms used in Cost Accounting Standards promulgated by the Board.

The Department of Defense, the National Aeronautics and Space Administration, and the Atomic Energy Commission have issued regulations through joint action which are parallel in structure and content to the issuances of the Cost Accounting Standards Board and, hence, implement the standards in the respective agencies. The General Services Administration has provided that the Cost Accounting Standards Board's Standards, rules, and regulations are to be extended to non-defense as well as defense contracts of the civilian executive agencies. All of these regulations became effective 1 July 1972.

A standard on "Allocation of Home Office Expenses to Segments" was issued on 14 December 1972. This standard governs how a contractor may allocate expenses of its corporate headquarters to various divisions, subsidiaries or plants. The standard prescribes criteria for allocation based primarily on the beneficial or causal relationship between such expenses and the receiving segments [Federal Register, 14 Dec 1972].

A standard on "Capitalization of Tangible Assets" was issued on 27 February 1973. It applies to expenditures for acquisition of tangible capital assets during the contractor's next fiscal year beginning on or after 1 October 1973. It establishes rules for fixed asset accounting in order to determine the acquisition costs to be capitalized as opposed to those which are charged against revenues of the current accounting period. A capitalization policy in accordance with this standard is intended to facilitate measurement of costs consistently over time [Federal Register, 27 Feb 1973].

A standard on "Accounting for Unallowable Costs" was issued on 6 September 1973. It was established to provide guidelines to cover identification by contractors of specific costs which are unallowable at the time such costs first become defined or are authoritatively designated as unallowable and to cover the cost accounting treatment to be accorded such costs [Federal Register, 6 Sep 1973].

The Cost Accounting Standards Board has selected further subjects for research work in connection with possible development of Cost Accounting Standards. These include [Schoenhaut, 1973]:

1. Depreciation
2. Standard costs
3. Vacation, sick pay, and holiday pay

4. Cost accounting period

5. Segment general and administrative expenses

6. Scrap

7. Termination accounting

8. Inventory pricing

9. Special facilities

10. Retirement plan costs

11. Allocation of burden

12. Cost of capital

13. Deferred incentive compensation

14. Other labor-related costs

15. Direct and indirect costs

16. Independent research & development and bidding & proposal costs

17. Current value or price-level accounting

18. Terminology for cost accounting

C. STATISTICAL HISTORY OF FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT

An indication of the emphasis placed on research and development as a foundation of the nation's technological effort appears in the ratio of R&D expenditures to the gross national product (GNP), a measure of the total output of goods and services in the United States. In 1964, total R&D spending in the economy reached a peak of 3.0 percent of the GNP. R&D expenditures have declined in relation to GNP since that time, reaching 2.7 percent in 1970. Figure 9 depicts the trend [NSF Report 72-309, 1972].

During the early 1950's, growth in total Federal R&D was slow but steady. By 1957 the growth rate accelerated, reaching a peak of over 12 percent of Federal budget outlays in 1964-1965, and an expenditure peak

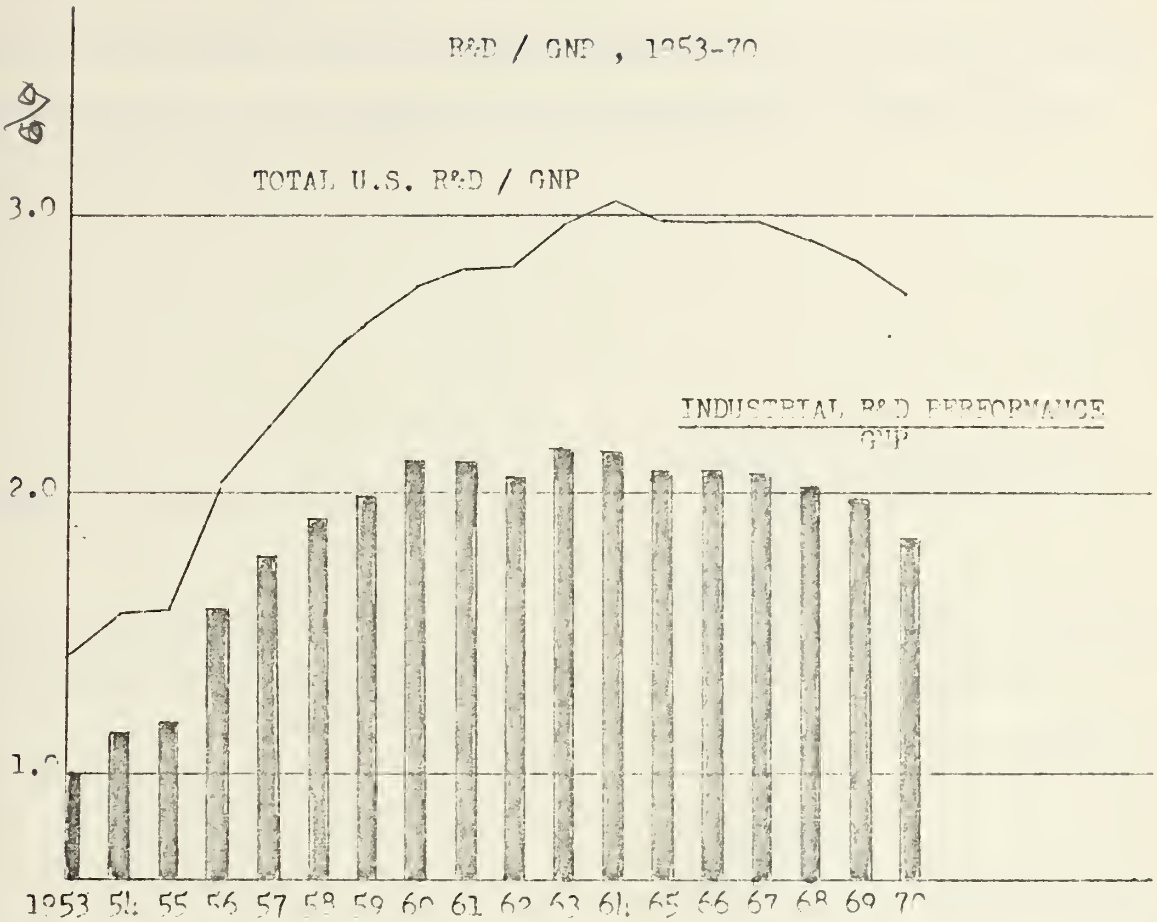


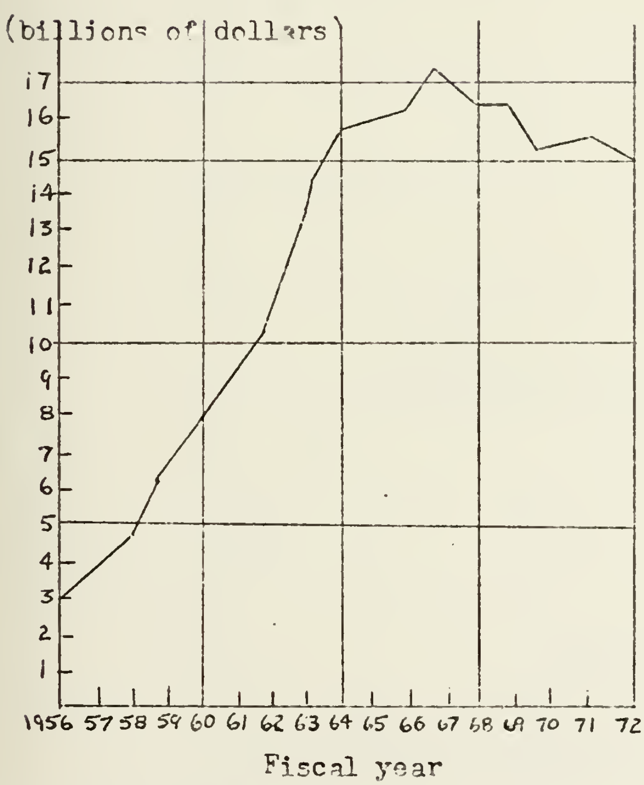
FIGURE 9

Source: National Science Foundation, 1972

of greater than $17 billion in fiscal 1967, as indicated in Figure 10, which was developed from various National Science Foundation reports [Commission on Government Procurement Report, Vol. 2, 1972, p. 12]. The total R&D obligations declined after 1967 to $15.5 billion in fiscal 1971. This represents about 7 percent of the Federal budget. R&D obligations were expected to total $15.2 billion in fiscal 1972 and $17.8 billion in fiscal 1973 [Special Analyses of the United States Government, Fiscal Year 1973, p. 18].

In 1972 Federal agencies were expected to provide 54 percent of all national R&D funds, with support supplied by industry estimated at 40 percent. The largest Federal support share was recorded in 1964 at more than 65 percent of the national total, as indicated in figure 11 [NSF Report 72-317, 1972, p. 3].

TRENDS IN FEDERAL R&D OBLIGATIONS*



* current dollars

FIGURE 10

TRENDS IN NATIONAL R&D FUNDING BY MAJOR SOURCE

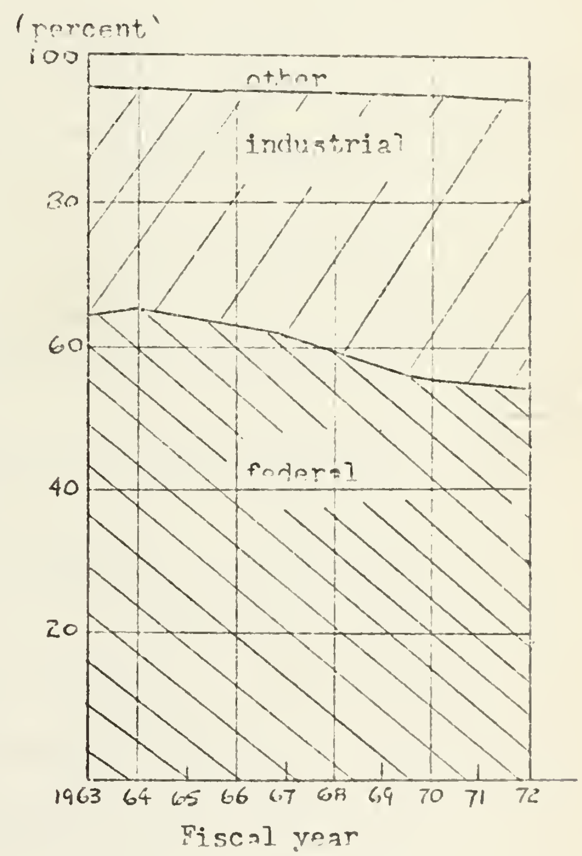


FIGURE 11

Source: National Science Foundation

Figure 12 [NSF Report 72-317, 1972, p. 6] indicates the trends in R&D obligations of Federal agencies leading in R&D programs. In 1973 the share of DOD in the Federal R&D total was expected to be 50 percent, compared with 58 percent in 1963. The National Aeronautics and Space Administration's (NASA) share was an anticipated 19 percent in 1973, compared with 34 percent in 1965, the highest NASA share. The Department of Health, Education, and Welfare (HEW) was expected to carry out 11 percent of the total in 1973, more than twice its 5 percent share of 1963.

TRENDS IN R&D OBLIGATIONS OF FEDERAL
AGENCIES LEADING IN R&D PROGRAMS

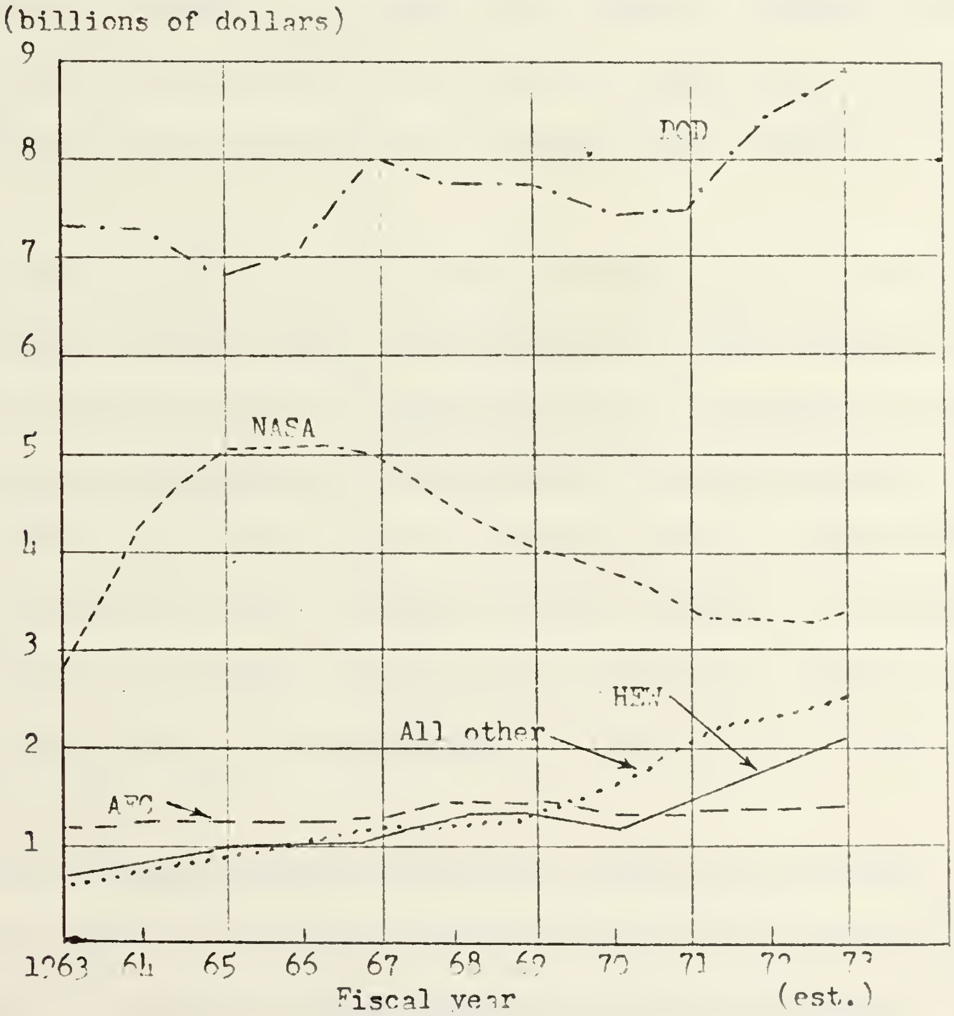


FIGURE 12

Source: National Science Foundation

The Atomic Energy Commission (AEC) will account for an estimated 8 percent of the Federal R&D effort in 1973, compared with 9 percent in 1963. The 31 other agencies reporting R&D programs in the current (1971-73) period show a significant rise in aggregate R&D support. This group has moved from a 5 percent share in 1963 to an expected 14 percent in 1973. The greatest dollar increases in this group in the period 1971-73 are recorded by the National Science Foundation.

Trends in Federal R&D obligations by major performer (Figure 13 [NSF Report 72-317, 1972, p. 8]) shows that, during the 1963-73 period, industrial performance as a share of the Federal R&D total will have decreased from 66 percent to 52 percent, while Federal intramural performance will have increased from 18 percent to 26 percent and universities and colleges' share of R&D will have increased from 7 percent to 12 percent.

The chief funding of industrial R&D performance has for many years been provided by DOD and NASA, and the decline in NASA's overall activities is the principal cause of diminished support to industry in recent years, just as DOD programs now influence rising industry support. In 1973, the DOD share of R&D support to industrial firms, including Federally Funded Research and Development Centers (FFRDC's), is estimated at 62 percent of the Federal total, whereas the share of support represented by NASA, AEC, and the Department of Transportation is lower than in former years.

National Science Foundation statistics indicate that, in 1970, the industrial sector of the economy accounted for 68 percent of the nation's R&D effort. Government and institutional laboratories accounted for the remainder [NSF Report 72-309, 1972, p. 2]. Approximately 44 percent of

TRENDS IN FEDERAL R&D OBLIGATIONS BY MAJOR PERFORMER

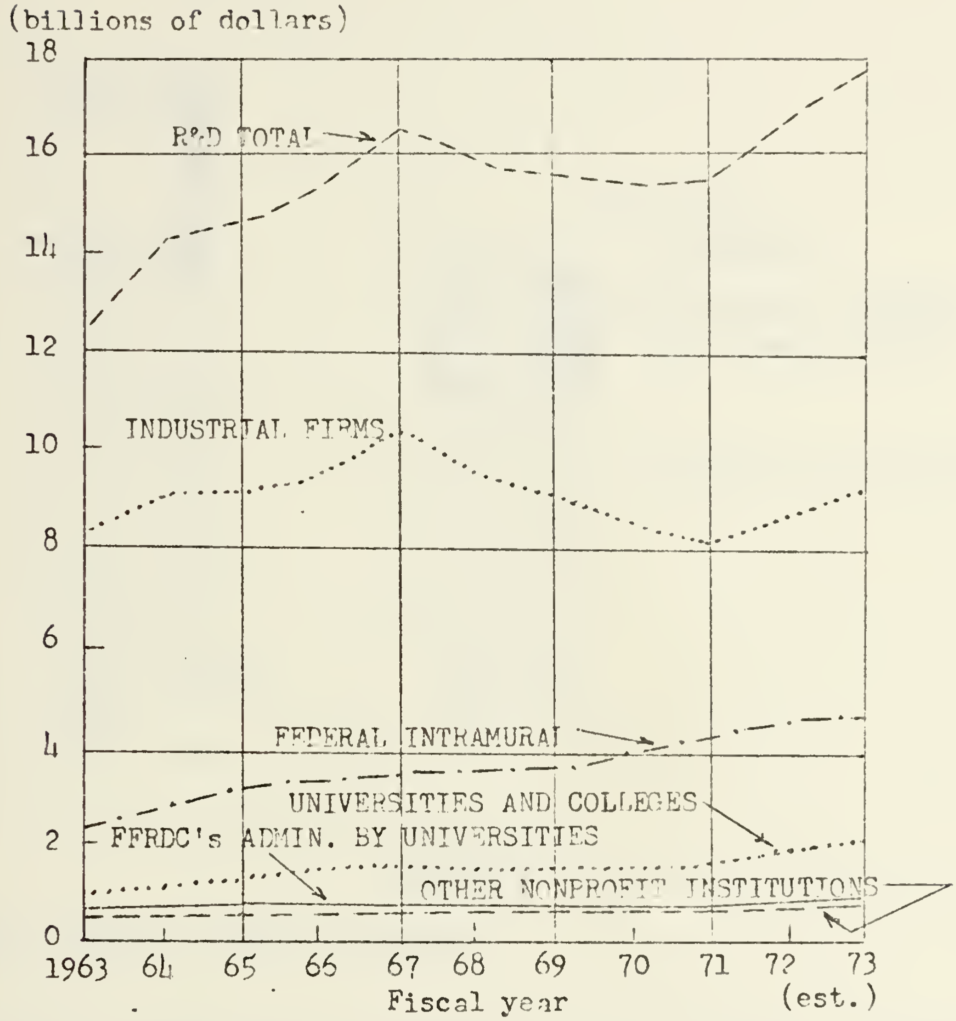


FIGURE 13

Source: National Science Foundation

the work that companies performed in their facilities was paid for by Government agencies. Further, two-thirds of Federal R&D funds in industry ($5.2 billion) was provided by the Department of Defense in 1970. The two leading industries receiving this support were, as indicated in figure 14, the aircraft and missile industry with $2.7 billion and the

FEDERAL R&D SUPPORT IN
TWO LEADING INDUSTRIES, 1970

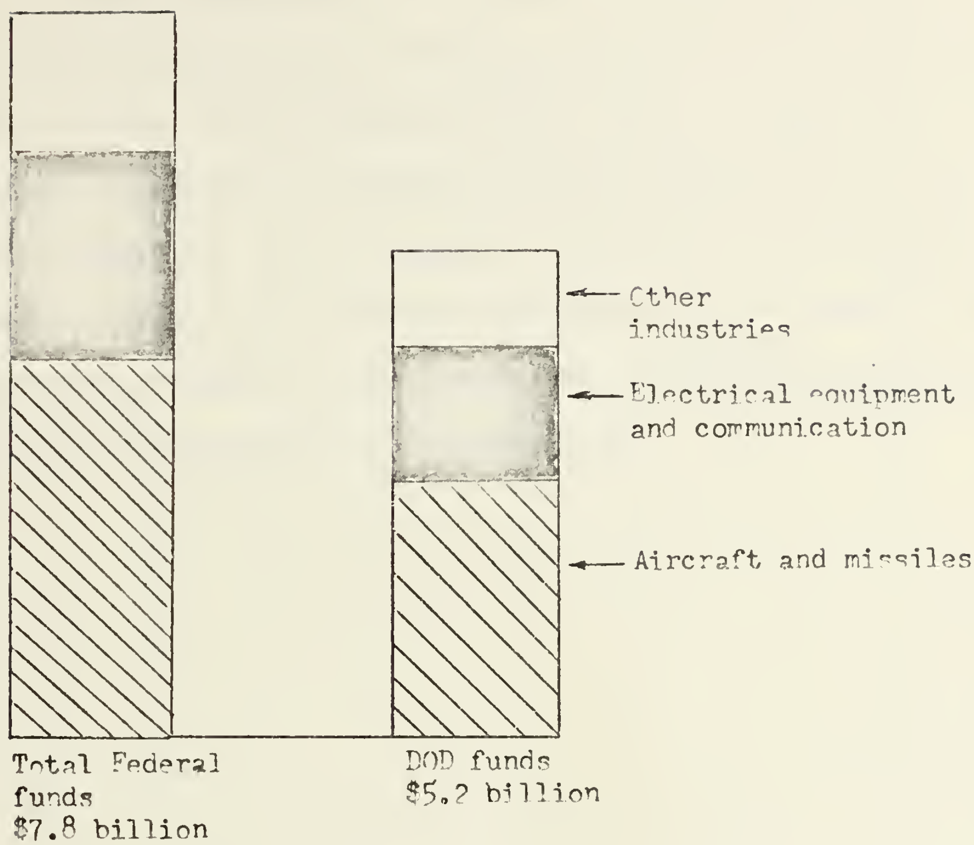


FIGURE 14

Source: National Chart of Accounts

electrical and communication industry with $1.5 billion. These two industries accounted for 82 percent of the Defense Department funds [NSF Report 72-309, 1972, p. 8].

Table III is provided to indicate the size and the relationship of IR&D, B&P, and OTE costs. It shows the annual amount of each cost element since 1963, in three aspects: (i) total cost incurred by the contractors, (ii) DOD decision of what the contractors should spend and could recover in overhead, that is, the amount accepted, and (iii) the amount of expense which could be recovered in DOD contracts (DOD share).

Although there has been a steady increase over the years for each cost element, the emphasis given by the contractors to each element has been changing. Using DOD figures for total cost incurred, B&P costs as a percentage of IR&D costs have been declining -- from 60 percent in 1963 to 51 percent in 1968. Other Technical Effort (OTE) has experienced a similar decline. The relative increase in IR&D over B&P and OTE has generally been attributed to the increasing technological demands of the marketplace. It should be noted that information will no longer be collected under the heading of "OTE" because these costs have been reclassified into the IR&D and B&P cost classifications.

TABLE III

DOD Summary of IR&D, B&P, and OTE Costs for Major Defense Contractors
[Millions of Dollars]

[A = Costs Incurred, B = Amount Accepted by the Government, C = DOD Share]

YEAR	IR&D			B&P			OTE			TOTAL		
	A	B	C	A	B	C	A	B	C	A	B	C
1963	389	255	197	236	230	178	157	118	84	782	603	459
1964	419	272	199	252	245	182	182	119	71	853	636	452
1965	439	300	198	277	271	186	237	140	76	953	711	460
1966	502	357	224	315	302	202	238	171	91	1055	830	517
1967	591	439	277	338	325	230	292	163	92	1221	927	599
1968	752	572	333	387	372	275	257	126	77	1391	1070	685
1969	808	653	389	426	407	286	178	128	79	1412	1188	754
1970	753	597	376	414	398	278	169	120	73	1294	1087	695
1971	703	568	354	428	390	265	NA	NA	NA	NA	NA	NA
1972	776	620	400	469	432	304	NA	NA	NA	NA	NA	NA

NA = NOT AVAILABLE

Sources:
(1963-1968) GAO Report B-164912, 16 Feb. 1970, pp. 86-87.
(1969-1970) Congressional Record, 24 Mar. 1971, p. S3818 and Memo from DDR&E to Commission on Government Procurement, 7 Feb. 1972.
(1970-1971) Congressional Record, 11 May 1972, p. S7683.
(1971-1972) Congressional Record, 8 May 1973, p. S8571.

III. ALLOCABILITY OF IR&D AND B&P COSTS

Because the Government procures a significant number of items for which it is impractical to secure effective price competition, procedures are needed to insure that prices charged are fair and reasonable. Hence, the extent to which IR&D and B&P costs are included in the total price of the items bought is of much interest to Government.

Contractors generally feel that IR&D is merely a normal cost of doing business and should not be singled out for special consideration. However, Government representatives generally feel that, where there is a lack of normal competitive constraints, IR&D should be subject to cost control in order to preclude excessive charges to the Government.

In order to determine whether or not excessive charges are being presented by the contractor, the total cost must be examined in terms of the elements which make it up. The total cost of a contract is considered to be the sum of the allowable direct and indirect costs allocable to the contract, incurred or to be incurred, less any allocable credits [ASPR Section 15-201.1, 1973]. Additionally, ASPR provides that any generally accepted method of determining or estimating costs that is equitable under the circumstances may be used when ascertaining what constitutes costs.

To make the above statements more meaningful, the terms and ideas will be discussed and amplifying information will be presented. Further, results of the IR&D and B&P questionnaire originated for this work will be presented.

A. FAIR AND REASONABLE PRICE

In a competitive economy, prices are the devices for the allocation of resources. Price is determined by the forces of the marketplace. When an item is in increasing demand, the price for that item tends to increase; when the supply is greater than the demand, the price usually drops. When prices are high, resources are attracted to the successful industry and production is increased. When the demand is satisfied and the supply becomes excessive, buying falls off, prices decline and then supply declines in response. Hence, resources which formerly were used by the industry are syphoned off into other, more active, markets.

1. Prices

The Government recognizes that prices are directly related to profit and that profit is the prime motivator of private enterprise. The objective of an entrepreneur is to sell at a price that will cover expenses and, at the same time, provide a margin that will net a reasonable profit. On the other hand, the Government's objective is to buy at the lowest ultimate overall contract price. In achieving this objective, the Government desires to pay a "fair and reasonable price" [ASPR Section 3-801.1, 1973].

The phrase "fair and reasonable" describes a conclusion as to price. It implies that the price is acceptable to both the Government and the seller. However, the validity of the decision that a price is fair and reasonable depends upon the factors considered and the evaluation of those factors in reaching that conclusion.

In Government competitive procurements by formal advertising -- where the award is made to the low responsible bidder whose bid conforms to the invitation and is the most advantageous to the United States in

terms of price and other factors -- the price is normally presumed to be fair and reasonable.

In Government procurement by negotiation, the lowest offer is not necessarily fair and reasonable. Other factors that are considered include the quality in relation to use, the ability to deliver on time, and the ultimate cost to the taxpayer. The ultimate cost may be measured by such things as ease and cost of maintenance, transportation costs and service life in addition to the cost of acquisition. Demonstration that a given price is fair and reasonable depends on how the buyer reaches the decision to buy at that price, how price comparisons are made, how Government engineering estimates and detailed estimates of the cost to perform are made, and how negotiations are prepared for and conducted.

The cost-plus system of pricing applies to situations wherein the contractor prices the product at cost plus an additional amount for profit. This method is widely used in the defense industry where price competition is lacking or the product is very distinctive.

Non-competitive contracts occupy a large percentage of total Government procurement. To illustrate this fact, in fiscal year 1972 the Navy spent $12.2 billion in total direct purchases; of this total, $8.8 billion (72 percent) was for non-competitive purchases [NAVMAT P-4200, June 1972, p. 2]. Much of the $8.8 billion was used to contract with major defense contractors for high dollar value programs. In order to insure that the Government pays a fair and reasonable price, the Government must concern itself with all costs in the non-competitive environment.

2. <u>Costs</u>

Costs are associated with resources -- material, services, facilities, equipment, personnel, and information -- required to produce the

product. The consumption of these necessary resources is measured in terms of money.

There is no simple or single definition of cost which serves all situations and uses. Cost means different things under different circumstances. A cost may be considered to be a measurable expenditure to acquire a product or service. Further, a cost may result from an expenditure of cash or incurrence of a liability. In contracting, the Government is concerned with its total cost of acquiring goods or services. On the other hand, the contractor is concerned with his total revenue from the contract and his incremental or marginal cost -- the additional cost that will be incurred if that contract is undertaken.

Costs are always the costs of something. The item to which the cost is related is called a "cost objective." A cost objective is defined as [ASPR Section 15-109, 1973]:

a function, organizational subdivision, contract, or other work unit for which cost data are desired and for which provision is made to accumulate and measure the cost of processes, products, jobs, capitalized projects, et cetera.

Specifying the cost objective is a decisive factor in the collection and assignment of costs because it sets the focus of interest in cost determination. Establishing the cost of something implies that there is some way to determine what costs are pertinent to that cost objective.

In order to determine that a given cost is assignable to a particular cost objective, a criterion is needed. The conventional approach is to use the concepts of direct and indirect costs, which have the effect of dividing the issue of cost assignment into two parts. Direct cost and indirect cost are defined in ASPR [ASPR Section 15-109, 1973].

Direct Cost - Any cost which is identified specifically with a particular final cost objective. Direct costs are not limited to items which are incorporated in the end product as material or labor. Costs identified

specifically with a contract are direct costs of that contract. All costs identified specifically with other final cost objectives of the contractor are direct costs of those cost objectives.

Indirect Cost - Any cost not directly identified with a single final cost objective, but identified with two or more final cost objectives or with at least one intermediate cost objective.

Hence, a direct cost is any cost which can be identified specifically with only one cost objective such as a product, a contract, or an organizational unit. Materials and labor that are used in the manufacture of a product or in the performance of a contract are direct costs to the product or the contract and are charged to each of these cost objectives.

An indirect cost is one which is incurred for, or which benefits, common or joint objectives. After direct costs have been determined and charged directly to the contract or other work, as appropriate, indirect costs are those remaining to be allocated to the several classes of work. There is no direct relation between expenditure and cost objective when considering indirect costs. Nevertheless, indirect cost assignments ideally are based on some demonstrable relationships between the cost incurrence and the factor used to complete the cost assignment.

These indirect costs are the costs simply of being in business and are incurred in running the production plant, in the general administration of the company, and in other activities such as selling, engineering, tooling, and research and development. Most firms collect indirect costs in various logical cost groupings, with due consideration of the reasons for incurring the costs. Each grouping, or indirect cost pool, is determined so as to permit distribution on the basis of the benefits accruing to the several cost objectives. Thus, a manufacturing firm may keep separate accounts for manufacturing overhead, engineering overhead, research and development overhead, and general and administrative expenses. Each overhead pool would then be distributed to appropriate

products or contracts. To do this fairly requires the selection of a distribution base common to all cost objectives to which the grouping is to be assigned. This may be accomplished on the basis of the direct costs associated with the particular overhead pool. For example, manufacturing overhead may be allocated on the basis of direct manufacturing labor, engineering overhead on the basis of direct engineering labor, et cetera. Whatever the basis, a contractor should be sure that it is in accordance with applicable cost accounting standards or generally accepted accounting principles.

A breakdown of direct and indirect costs which compose product or contract costs is illustrated in figure 15 [Ohio State University, 1971].

DIRECT AND INDIRECT COSTS

DIRECT COSTS	DIRECT MATERIALS	+		DIRECT LABOR =	PRIME COSTS +
INDIRECT COSTS (Manufacturing)	INDIRECT MATERIALS AND SUPPLIES +	INDIRECT LABOR +	COSTS ASSOCIATED WITH LABOR +	OTHER INDIRECT COSTS =	MANUFACTURING OVERHEAD (Burden)
	Paint, Nails, & Bolts (Physically embodied in product but are minor in amount) Shop Supplies Lubricants Small Tools	Supervision (Supt. & Fore.) Factory Clerks Inspection Maintenance	Social Security Taxes Unemployment Taxes Vacation Pay Group Insurance	Rent Property Taxes Insurance Depreciation Heat, Light, & Power	= MANUFACTURING COST (Factory) +
INDIRECT COSTS (Operating Expenses)	SELLING EXPENSES	+		GENERAL AND ADMINISTRATIVE EXPENSES =	OPERATING EXPENSES
	Salesmen's Salaries & Commissions Advertising Samples Entertainment Travel Expenses Rent Telephone & Telegraph Stationary & Printing Postage Freight - out Doubtful Accounts Depreciation			Administrative Office & Salaries Rent Legal Depreciation Telephone & Telegraph Stationary & Printing Postage (Some companies include selling expenses in G&A expenses)	= TOTAL COST + PROFIT = SELLING PRICE
OTHER DIRECT COSTS OTHER INDIRECT COSTS	DIRECT ENGINEERING, DIRECT R&D, DIRECT TOOLING INDIRECT ENGINEERING, INDIRECT R&D, INDIRECT TOOLING				

FIGURE 15

Source: Ohio State University

To allocate, or distribute over a base, is defined in ASPR [ASPR Section 15-109, 1973].

Allocate - To assign an item of cost, or a group of items of cost, to one or more cost objectives. This term includes both direct assignment of cost and the reassignment of a share from an indirect cost pool.

A cost is considered allocable if it is assignable or chargeable to one or more cost objectives in accordance with the relative benefits received or other equitable relationship. Subject to this, a cost is allocable to a Government contract if it [ASPR Section 15-201.4, 1973]

(a) is incurred specifically for the contract;

(b) benefits both the contract or other work, or both Government work and other work, and can be distributed to them in reasonable proportion to the benefits received; or

(c) is necessary to the overall operation of the business, although a direct relationship to any particular cost objective cannot be shown.

The costs flow through a hierarchy of cost pools in order to enable their proper assignment. Activities are interrelated in most organizations; various departments or units produce services that are used by others. Each of these intermediate service centers is represented in the pattern of cost analysis as a collection of costs (cost pool) traceable to that center and assignable to the users of its service. A cost pool may also exist for each product cost center wherein the final product is manufactured. Costs which clearly arise from, and are assignable to, any one of these product centers are added to intermediate service center costs. This aggregate is then used as a higher level cost pool from which costs are assigned to the processes or products.

Cost pools tend to average the costs assigned to them, and, therefore, the included elements need to be homogeneous. That is to say, the cost pool constituents should be similar in the sense that they are amenable to adding together without distorting the significance of the results

when spread among the cost objectives by a common allocation base. The common base is one that permits equitable distribution of the cost pool with respect to the benefits received by the appropriate cost objectives. This base should be closely related both to the pooled costs and to the cost objective.

The only way to ascertain that the costs and services are homogeneous is to examine the data in detail -- from the cost side and also from the standpoint of the nature of the services that flow from given cost centers. This necessitates a compromise between accuracy and expediency; greater accuracy requires more time and effort, which result in higher cost.

B. IR&D AND B&P COSTS

IR&D and B&P costs are just two of the many types of costs considered in Government negotiated contracts. A portion of the costs of a contractor's IR&D and B&P efforts is generally supported by Government agencies through the allowance of such costs as an independent charge to contracts. Before being allocated to the various contracts -- the cost objectives -- these costs are accumulated in their respective cost pools. Great diversity of opinion exists regarding these cost pools and their allocation. The controversy is centered around the following issues:

a. What is the most practical method of classifying and accumulating IR&D and B&P costs into the cost pools? The associated problems relate to the definitions of these costs and the composition of the cost pools.

b. What are the most reasonable methods of allocation of IR&D and B&P costs? This concerns attempting to assign the costs to the products and contracts that should appropriately bear all or a portion of the costs.

c. What should the basis for allocation of the costs be? This area concerns the determination of what key should be used to distribute these costs equitably.

These issues are addressed in the remaining pages of this chapter. Additionally, the area of deferral or immediate recognition of IR&D and B&P costs will be covered because of its importance to the subject of when R&D costs should be paid. Finally, cost accounting standards, as related to IR&D and B&P costs, will be considered.

1. Definitions for Research and Development

Research and development is defined in various ways. Most definitions make a distinction between basic research, applied research, and development. An accounting definition, as contrasted with a technical definition, is intended to provide a uniform basis for classifying expenditures as research and development. Hence, an accounting definition for research and development needs to be a practical, precise definition. Furthermore, it is desirable that all contractors use the same general principles for determining the amounts to be reported as R&D costs so that the Government as well as stockholders can compare a particular company with another on the same basis.

The best known definition of R&D is probably that used by the National Science Foundation. It is very similar to that used by the Department of Defense. However, numerous other definitions exist because many companies define R&D in individual ways for internal purposes. The National Science Foundation defines R&D by identifying the types of activities that are included and the other types of activities that are excluded. Individual companies are requested to make reports to the National Science Foundation based upon this stated definition.

That definition is as follows [NSF Report 72-309, 1972, p. 23]:

Research and development - Basic and applied research in the sciences and engineering and the design and development of prototypes and processes. This definition excludes quality control, routine product testing, market research, sales promotion, sales service, research in the social sciences or psychology, and other nontechnological activities or technical services.

Basic research - Original investigations for the advancement of scientific knowledge not having specific commercial objectives, although such investigations may be in fields of present or potential interest to the reporting company.

Applied research - Investigations directed to the discovery of new scientific knowledge having specific commercial objectives with respect to products or processes. This definition differs from that of basic research chiefly in terms of the objectives of the reporting company.

Development - Technical activities of a nonroutine nature concerned with translating research findings or other scientific knowledge into products or processes. Does not include routine technical services to customers or other activities excluded from the above definition of research and development.

Some firms find the National Science Foundation definitions unsuitable for industrial research. Robert L. Hershey, former Vice President and Director of E.I. du Pont Nemours & Company, believes that, in a business sense (as opposed to a scientific sense), a company must think in terms of research and development. Thus, he stated that du Pont classified R&D into three categories: (i) improvement of established business, (ii) exploratory research, and (iii) new venture development [Hershey, 1966].

The Industrial Research Institute, representing some 230 industrial companies with large R&D programs, believes that the three categories of (i) exploratory research, (ii) high-risk business development, and (iii) support of existing business are more adequate descriptions of the types of industrial R&D activities than the National Science Foundation definitions [Gee, 1971].

An American Institute of Certified Public Accountants (AICPA) study indicates that a general accounting definition of R&D that is precise enough to be used in all companies probably cannot be developed. It proposes that definitions on an industry-by-industry basis probably could be developed. The study reports that an analysis of the various bases of classifying R&D by type has been resolved into a matrix showing the characteristics of each type based on people, place, purpose, process, and proceeds. The matrix, shown in figure 16, presents some general criteria that accountants could use to assist industry's research managers in determining projects that should and those that should not be considered as valid R&D projects. Although the matrix includes technical support because it is closely related to R&D, technical support cost should be excluded as it is not, in actuality, valid R&D [Gellein & Newman, 1973, p. 40].

2. Composition of R&D Costs

Research and development costs can be accumulated and classified into materials, labor, and other costs normally treated as overhead. Salaries of professional and technical personnel and the cost of related fringe benefits constitute a major element of these costs. Costs of materials and supplies may be significant in some research efforts because researchers often need materials that are expensive and difficult to obtain. Other costs may consist primarily of depreciation of buildings and equipment, maintenance, and taxes.

A major area of dispute is associated with whether or not indirect and general and administrative (G&A) costs applicable to the IR&D effort should be included in determining the total amount of allocable IR&D cost. Contractors generally use one of four different composition

MATRIX FOR RESEARCH AND DEVELOPMENT

TYPE OF RESEARCH AND DEVELOPMENT	DISTINGUISHING CRITERIA				
	PEOPLE	PLACE	PURPOSE	PROCESS	PROCEEDS
BASIC RESEARCH Fundamental research Pure research Exploratory research	Creative, curious, unrestrained individuals motivated by scientific tradition.	University or non-profit foundation, government laboratories, and a few industrial laboratories.	To understand the unknown and to contribute to new knowledge.	Investigating new scientific phenomena, discovering secrets of nature, and verifying theories of the physical world.	New knowledge to be presented or distributed to, and evaluated by, a group of scientific peers.
APPLIED RESEARCH Invention Technological research	Creative, curious individuals of varied backgrounds externally directed by market needs.	Industrial, university, government, and commercial research laboratories.	To explore practical possibilities of creating new products and processes. To satisfy heretofore unsatisfied wants.	Creating, inventing or discovering new components, devices, compounds or processes or modifying and combining existing materials, devices, compounds or processes to produce a new application.	Theories or knowledge about natural or industrial materials, processes, and potential products, tests of all areas of uncertainty, and proof of technical feasibility.
DEVELOPMENT New product development New process development Major improvements or new uses Evolutionary inventions Testing Evaluation	Individual effort often reinforced by teams of scientists and engineers, with planning and organizing skills, who work well together.	Industrial laboratories and pilot plants.	To create reliable and satisfactory new or greatly improved products or processes.	Using professional teams with varied skills and greater resources to resolve major technological aspects of new or greatly improved products or processes.	Technical specifications and production requirements for new or greatly improved products or processes.
TECHNICAL SUPPORT Application engineering Cost reduction Product maintenance Product engineering Foreign intelligence Technical information Quality control	Scientists, engineers, and technicians.	Industrial laboratories and production facilities or in the field.	To aid in maximizing the return on current products or product lines.	Using highly trained people and substantial resources to meet varying requirements of the marketing and producing departments.	Technical services or reports as appropriate.

FIGURE 16

Source: AICPA Accounting Research Study No. 14

methods in accounting for IR&D and B&P costs. These methods of composition include the following:

a. Only direct costs,

b. Direct costs and G&A costs,

c. Direct costs and all allocable indirect costs except that G&A costs are not considered allocable, or

d. Direct costs, allocable indirect costs and G&A costs applicable to the IR&D effort.

The use of different methods by different contractors tends to create confusion and uncertainty as to actual IR&D and B&P costs when Government personnel or stockholders attempt to compare the costs of various contractors.

The charging of indirect costs to IR&D and B&P is addressed in ASPR subsections 15-205.35(b) and 15-205.3(b), respectively. These subsections provide that the composition is to include not only all direct costs but also all allocable indirect costs, except that G&A costs are not to be considered allocable to them. It is further stated that both direct and indirect costs are to be determined on the same basis as if each IR&D or B&P project were under contract.

The IR&D and B&P questionnaire results indicated that 52 percent of all surveyed were in favor of the present policy, which stipulates using direct and indirect cost but not G&A expenses. The method that includes direct, indirect, and G&A costs was preferred by 23 percent of those polled; 21 percent favored including only direct costs; 4 percent favored including direct and G&A costs.

Contrasted with the Department of Defense policy for the composition of IR&D costs, the Atomic Energy Commission (AEC) requires that

the costs of IR&D, whether or not accepted as allowable, must include an amount for the related indirect and administrative costs, regardless of the contractor's accounting practices [GAO Report B-164912, 1970, p. 19].

In an investigation of the various companies' accounting procedures, the General Accounting Office (GAO) found situations where contractors did not charge factory overhead and/or G&A expenses to IR&D costs, particularly that portion of IR&D costs to be absorbed by the contractor. Consequently, the applicable factory overhead and G&A expenses were allocated to all Government and commercial work exclusive of IR&D. Hence, IR&D did not bear its proportionate share of indirect costs, including G&A expenses, as did all the other work projects [GAO Cost Accounting Standards Feasibility Report, 1970, p. 56-58].

In a 1965 Army Audit Agency report it was stated that their experience over the years indicated that contractors generally did not burden IR&D effort but that direct R&D work was burdened[2] [GAO Report B-164912, 1970, p. 62].

A GAO analysis of seventy-three advance agreements on IR&D for fiscal year 1966 showed that burdening of IR&D was provided for in most cases. In forty-nine of those cases, the burdening included allocations of departmental overhead; in seventeen cases, the burdening included allocations of departmental and G&A overhead [GAO Report B-164912, 1970, p. 63].

In the AICPA accounting research study cited earlier, results of a 1965 survey of accounting practices for company R&D costs showed that 69 percent of the 209 mature companies and 70 percent of the 36 more

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[2]To burden a cost means to allocate overhead to the cost objective.

recently developed companies never included any G&A overhead in R&D costs [Gellein & Newman, 1973, p. 101].

The GAO stated that IR&D and B&P cost pools should be allocated an appropriate share of indirect and administrative costs. They reasoned that contracted R&D efforts are assessed such overhead charges in recognition of the fact that the contracted work could not be performed without the availability of space, heat, light, service, et cetera, which items are included as overhead costs and distributed to the company's activities. Thus, similar treatment should be given to IR&D and B&P costs to permit appropriate comparison of costs and to enable equitable treatment of all companies, many of which allocate overhead costs to these technical efforts. They stated that, while they believed it would be desirable to burden IR&D and related costs fully, they had no strong objections to not burdening with G&A expenses, as those expenses are normally relatively small in amount and did not have a material effect [Senate Armed Services Committee Hearings, 1970, p. 1918].

Contractors believe that their organizations, pricing structures and contract obligations vary widely and, consequently, so should their methods of cost distribution. The result is a wide range of accounting methods for overhead absorption. They believe that there is, therefore, no single set of cost accounting principles suitable to satisfy all of these varying requirements and that imposition of a single directed accounting system results in arbitrary compromises of contract cost distribution and tends to create inequity. Additionally, they think that standardization of burdening of individual indirect cost elements is not effective if employed selectively on particular elements of costs, in that there are numerous task-oriented indirect costs in addition to IR&D and B&P costs which are susceptible to such treatment. The accounting

treatment of these other costs also varies widely and not the equity of distribution to contracts, nor the need to manage the costs, nor the determination of reasonableness is enhanced by a mandatory requirement to burden them. Contractors feel that full burdening, except for G&A expenses, unreasonably inflates the cost of IR&D and B&P costs because many of the costs in the full burden are not applicable to IR&D and B&P costs or, if applicable, are so to a much smaller degeee [CODSIA letter, 23 Sep. 1968, to GAO Defense Division Director].

Some indirect costs are controllable directly in terms of volume of activity and others are fixed in amount as a consequence of earlier commitments. Such costs are fairly easily justified and controlled in relation to volume or the previous commitment, respectively. However, there are other indirect costs, such as IR&D and B&P, that are determined largely by management discretion and controlled primarily by periodic appropriations of fixed amounts. Hence, special visibility of their composition and allocation appears necessary so that the Government and the contractors can be assured that these costs are expressed in a consistent and uniform manner and, thus, are reasonably justifiable and controllable.

3. Allocation of Costs

The diversity of contractor activities and their purposes for being in business raises a variety of problems in accounting for IR&D and B&P costs and causes many of the differences in accounting practices. Measurement of the costs of research and development effort is possible, and it is also possible to assign these costs to those responsible for purposes of budgetary control. On the other hand, it is often very difficult to assign IR&D and B&P costs to products and to measure the results obtained from research in terms of sales income or profits. The reasons for this difficulty are that the outcome of experimental work always involves a

degree of uncertainty and also that there is often a substantial time lag between incurrence of research costs and realization of the benefits. These conditions are particularly significant where research of a broad exploratory nature is carried out. As the objectives of research effort become more definite and the outcome more predictable, research costs can be more readily assigned to the products or contracts which benefit.

The purpose of assigning R&D costs to products may be to show how much is being spent for R&D on each product or product line; it may be to determine profit or loss by desired product classification; it may be to obtain product costs for pricing purposes.

In the AICPA accounting research study cited earlier, results of a 1965 survey of accounting practices for company R&D costs showed that, for internal reporting purposes, 51 percent of 209 mature companies always allocated indirect R&D costs as overhead to specific projects. However, 56 percent of 36 more recently developed companies never did so.

The cost of goods and services are recorded when acquired. A National Association of Accountants (NAA) report indicated that costs can be classified by "object of expenditure" (such as labor and material), by "time length of expected usefulness," by "function or department" within the firm, and by the "end object" to which the services or goods contribute (such as a contract) [Bulloch, 1972, p. 12]. Only the object of expenditure and the length of expected usefulness can be applied to all goods and services at the instance of acquisition. Some, but not all, goods and services can be classified by all four methods. However, it may be impossible ever to relate a specific acquired item to a specific object.

The NAA research study states that the expected length of useful service, the function or department and the end object are the most

important for purposes of contract costing. The object of expenditure may be useful in determining how one or more of the three other classifications applies to a given acquired item and its cost, and it is also relevant where unallowable costs are specifically identified by object classification.

The NAA study examined cost accounting practices of fifteen defense contractors whose 1970 total contract volume was approximately five billion dollars. The study found that companies used different procedures and techniques for costing contracts. These differences seemed to result more from the fact that past practices were continued than from philosophical or conceptual disagreement.

The contractors' basic costing philosophy was to charge directly as much of the costs as was practicable. This objective was accomplished by manufacturing on a job order basis and by organizing the company so that the defense contract business was administered separately from commercial business. This was possible because the major products and services bought by the Government under cost based contracts were frequently unique to Government needs. A previous NAA report had similar findings [NAA Report No. 29, 1955, p. 52]. It found that the organization of the R&D unit and the nature of the work accomplished affected the extent to which costs could be assigned to divisions by direct charge.

The 1972 NAA study found in the analysis that the indirect cost flow could be classified into prior pools, final pools and, ultimately, assignment could be made to a final cost objective. The prior pools category included cost pools where costs were allocated to other prior pools, to final pools and occasionally to contracts. The final pools category represented cost pools whose costs were allocated only to final cost objectives -- with the exception that IR&D projects, which were treated as

final cost pools, received allocations from final pools and then were allocated to contracts. The objective of these various types of pools was to assign indirect costs to specific contracts or to commercial business. Figure 17 summarizes this general structure of the indirect costing process. Costs might not have actually been recorded against commercial business or firm fixed price contracts when the costs were unnecessary for determining billing amounts, but the process would have been carried through to totals in order to divide the costs correctly between proper segments of the business so that cost reimbursement type contracts were charged with their share of costs [Bulloch, 1972, p. 53].

4. Basis for Allocation

The basis for allocation of IR&D to Government contracts or similar cost objectives may be one of the following [Cost Accounting Standards Board Disclosure Statement, 1972]:

a. Sales
b. Cost of sales
c. Cost input (direct material, direct labor, other direct costs and applicable overhead)
d. Total cost incurred (cost input plus G&A expenses)
e. Prime cost (direct material, direct labor and other direct cost)
f. Processing or conversion cost (direct labor and applicable overhead)
g. Direct labor dollars
h. Direct labor hours
i. Machine hours
j. Usage
k. Unit of product
l. Direct material cost
m. Total payroll dollars (direct and indirect employees)
n. Headcount or number of employees (direct and indirect employees)

Some companies analyze each project when assigning IR&D and B&P costs. In this process, various bases of allocation are utilized to measure the incidence of these costs according to responsibility assumed and benefits received by the several divisions. Other companies group all

INDIRECT COST FLOW -- PRIOR AND FINAL POOLS

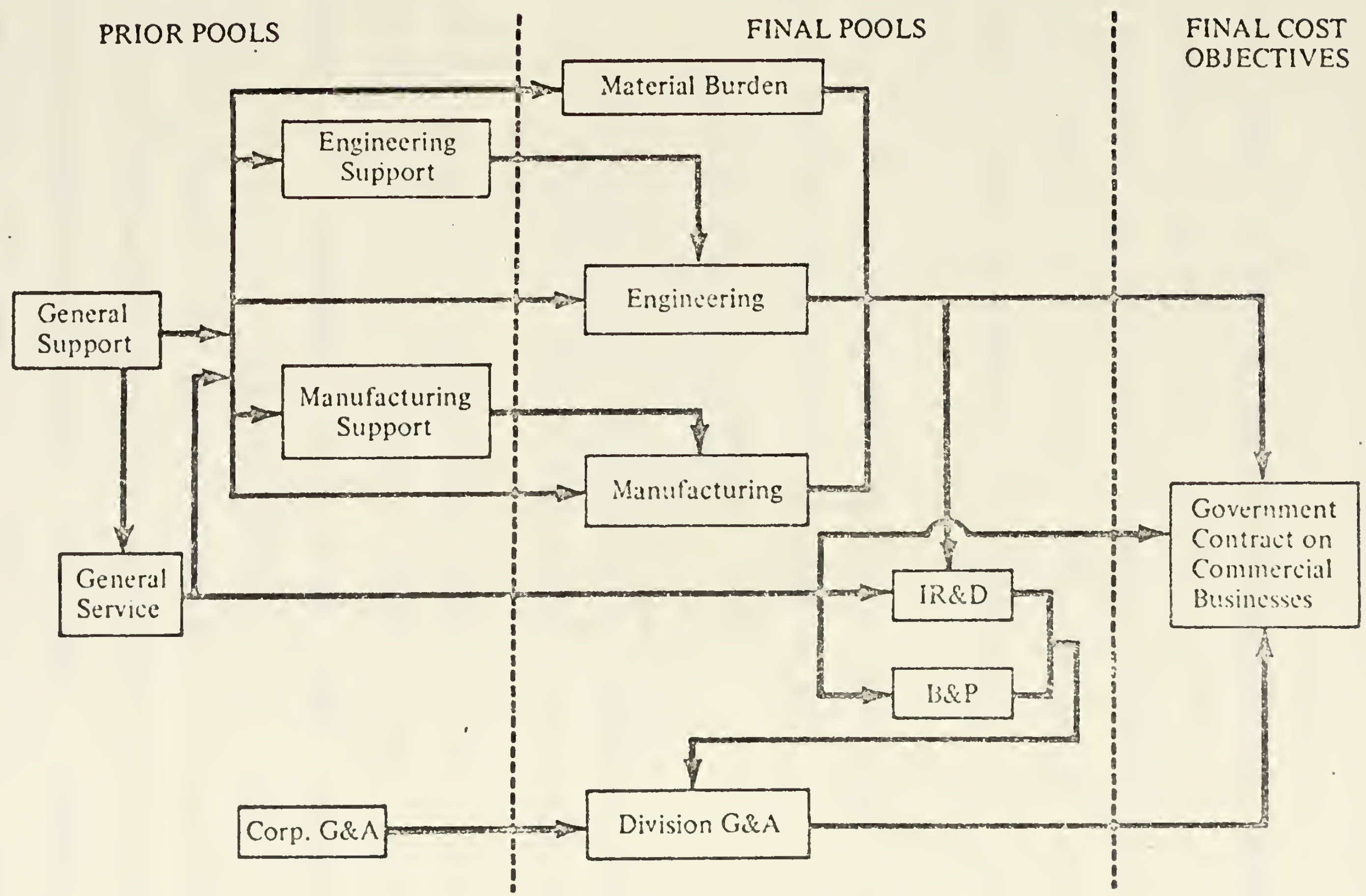

FIGURE 17

Source: Defense Contract Costing: The State of the Art, NAA Research Study

indirect IR&D and B&P costs together and allocate them to divisions on a single broad basis. Often, research and development expense constitutes one item in the group of central staff department expenses to be spread over operating divisions. Some companies attempt to find a basis for allocation which measures long-run benefits that the various divisions receive.

When research is concerned with increasing general knowledge and with new products unrelated to those currently manufactured, it is difficult to determine what divisions will benefit; and any basis for allocating costs is likely to be arbitrary. While such research may increase future profits, it has no traceable relationship to current manufacturing and selling activities.

Some of the allocation bases reported to be in actual use by companies are as follows [NAA Report No. 29, 1955, p. 54]:

a. Direct divisional research expense
b. Sales value of shipments
c. Cost of goods sold
d. Conversion cost of products manufactured
e. Allocation ratios established by negotiation with department heads
f. A composite of divisional sales, net or gross, and investment.

It was found in the 1972 NAA study [Ref. 6, p. 52] that the IR&D work of defense contractors was divided, without exception, among projects. Costs, with the exception of G&A expense, were accumulated for each project as if it were a contract. Projects were charged for direct materials, direct labor, other direct charges and the overhead which was related to the labor and material input. Similarity between contracts and IR&D projects ended at that point. G&A expense was charged to contracts based either upon incurred manufacturing and engineering cost or upon the manufacturing and engineering costs of that part of the contract

included in the cost of sales figure. IR&D costs, on the other hand, became part of the G&A cost pool rather than receiving a share of that pool or were allocated to contracts on the same basis as G&A expense without first receiving a charge for that expense. An exception to this procedure existed when there was a central laboratory, in that, along with the divisions, the laboratory was charged for a share of corporate G&A costs. The total (including allocated G&A costs) was allocated to divisions on the basis of cost of sales or incurred costs or some similar generalized basis and was then applied to contracts as division level G&A expense was allocated.

5. <u>Deferral or Immediate Recognition of IR&D Costs</u>

In accordance with the usual accounting concept of assets and the matching concept of income determination, costs incurred in a current period but expected to benefit some future period should be deferred now and then charged against the revenue of the future period. Early accounting literature and court decisions favored deferral of IR&D costs. However, practice has changed so that most IR&D costs are now recognized as expenses when incurred. Companies that have long experience with the subject generally defend the current practice as sound and necessary under the competitive conditions in which they operate [Gellein & Newman, 1973, p. 23].

Some reasons offered for viewing IR&D costs as a current expense are as follows [NAA Report No. 29, 1955, p. 45]:

a. Research costs are recurring annual costs similar to advertising and general administrative expense.

b. Benefits accruing from research often cannot be measured and related to sales of any specific period.

c. The success or failure of a research project may remain indeterminate for several years. It is, therefore, conservative to expense research costs rather than to admit an asset of uncertain value into the balance sheet which may later distort net income of a future period when it is written off.

d. The useful life of a successful research and development project frequently cannot be determined with sufficient accuracy to justify amortization.

e. When research and development is continuously undertaken, expensing all research and development costs tends to offset the nonmatching of costs and revenues of individual projects. As a result, annual net income is as accurate as it would be if costs were capitalized and amortized on a specific contract basis.

Exceptions to the treatment of research and development as an expense may occur in the following situations [NAA Report No. 29, 1955, p. 47]:

a. Some definite assurance exists concerning the success of an individual project, as in the case of a patent, formula, copyright, et cetera.

b. Research and development occurs irregularly and the benefits derived therefrom are expected to carry over to future periods.

c. Research and development is performed on a contract basis for the government and others.

d. There is a direct association of research and development to products such as the cost of pilot production runs, and the preparation of new markets and territories.

The AICPA study included a survey which showed that the predominant industry practice was to recognize R&D costs as expenses as they are

incurred. Better than 90 percent of those surveyed indicated that R&D expenditures should be written off as incurred. Approximately 60 percent felt that expensing R&D costs as they were incurred had little effect on being able to evaluate the profit performance of a company [Gellein & Newman, 1973, p. 102]. The IR&D and B&P questionnaire results indicated that 86 percent of those surveyed believed that these costs should be expensed rather than capitalized.

The aforementioned AICPA study indicated that the two-type classification of costs has submerged a type of costs with unique characteristics that is identified as "business-preserving costs." These costs are discretionary costs which are not related directly to current operations but are incurred to preserve the profitability of an enterprise over the long term. IR&D costs, by their nature, are a major element of business-preserving costs. Since these costs are intended to benefit the future rather than the present, the theory underlying current practice would tend to require that the costs be deferred and amortized over the future periods that they are intended to benefit [Gellein & Newman, 1973, p. 6]. However, the requirements of theory are difficult to apply practically, so, costs incurred in continuing research programs are recognized as expenses. Many of the factors pertaining to continuing research also pertain to development projects, but those projects have a greater probability of successful exploitation and a closer link with expected revenue.

The AICPA study concludes that costs of a project should be deferred only if they meet the following criteria [Gellein & Newman, 1973, p. 7]:

a. A significant project to develop a single product or a series of related products or processes should be established and well defined.

b. The Board of Directors should formally approve the project.
c. Technical feasibility of the products or processes to be developed should be determined and documented.
d. Reasonable probability of meeting planned time schedules for development, production, and sale or use of the products or processes should be demonstrable.
e. The estimated amount and the probable timing of potential revenue should be reasonably established.
f. Only costs incurred after management has evaluated and approved a project should be deferred.
g. Deferred costs should be limited to those that are reasonably allocable to specific future periods or future contracts.
h. A formal program should be established to periodically evaluate the project and to write off the costs that exceed expected revenue less completion and selling costs.

The cost deferral policy for the Department of Defense currently is that IR&D costs which were incurred in previous accounting periods are unallowable, except when a contractor has developed a specific product at his own risk in anticipation of recovering the development costs in the sale price of the product, provided that [ASPR Section 15-205.35(e), 1973]:

a. The total amount of IR&D costs applicable to the product can be identified.
b. The proration of such costs to sales of the product is reasonable.
c. The contractor had no Government business during the time that the costs were incurred or he did not allocate IR&D costs to Government contracts except to prorate the cost of developing a specific product to the sales of that product, and
d. No costs of current IR&D programs are allocated to Government work except to prorate the costs of developing a specific product to the sales of that product.

ASPR cost principles have generally discouraged or disallowed the recovery of deferred research and development expenses. The Government's policy may reflect a concern that contractors would capitalize the costs of successful R&D projects and amortize such costs over the sales life of the resulting products while, at the same time, write off during the current period the expenses associated with unsuccessful projects. Hence, the Government would be paying indirect costs on its contracts for unsuccessful ventures. However, capitalization of R&D could possibly have

for the Government because the contractor would be effecting his own financing in order to perform the R&D and the decision-making involved would include an incentive for efficiency.

C. COST ACCOUNTING STANDARDS FOR IR&D AND B&P COSTS

Cost accounting standards are designed to provide better guidelines for the use and limitation of alternate methods by contractors in reporting the cost of performance under negotiated contracts, with improved comparability, reliability and consistency. The relationship between allowability and allocability may be the single most important factor that is essential to the preparation of an IR&D and B&P cost accounting standard which will be capable of producing reliable, consistent, and comparable cost data with due regard to fairness for all concerned parties. As has been mentioned previously, the allocability of a cost is one of several factors affecting its allowability, but the subject of allowability should not influence the techniques of allocating and distributing costs to the various cost objectives.

There is a need for limiting the number of alternative methods of reporting costs. This need is indicated in a statement of William J. Casey, Chairman of the Securities and Exchange Commission, before the Conference on Financial Reporting in May 1972, when he said [Journal of Accountancy, Oct. 1972, p. 72]:

> It is my belief that a further reduction of permissible alternative accounting treatments in identical circumstances must be made. There is simply no basis for alternatives when fact situations are identical.

Further emphasis for this point of view is provided by an American Institute of Certified Public Accountants (AICPA) study which endorses greater restrictions on alternative methods of accounting for R&D costs [Gellein & Newman, 1973, p. 66].

Proper determination of the costs of negotiated contracts through consistent application of contractors' cost accounting practices is a major intent of the initial accounting standards. The standards require that a contractor follow consistently his own cost accounting practices as disclosed in the Disclosure Statement or as established by his own cost accounting practices if no Disclosure Statement is required. The contractor is required to follow consistently the same cost accounting practices in estimates of price, accumulations of cost and reports of costs under a given covered contract. Further, the contractor must follow consistently his classification of costs for the same purpose in like circumstances as either direct costs or as indirect costs [Cost Accounting Standards Board Report, 1972, pp. 19-22].

Whereas consistency relates to improving intra-contractor comparability when circumstances are alike, uniformity is designed to promote inter-contractor comparability when circumstances are alike. The present ASPR addresses itself to uniformity in general terms. ASPR states the following with respect to the composition of total cost [ASPR Section 15-201.1, 1973]:

In ascertaining what constitutes costs, any generally accepted method of determining or estimating costs that is equitable under the circumstances may be used.

ASPR states that the following are to be considered in determining the allocability of individual cost items [ASPR Section 15-201.2, 1973]:

Standards promulgated by the Cost Accounting Standards Board, if applicable, otherwise, generally accepted accounting principles and practices appropriate to the particular circumstances.

To achieve greater uniformity among the many contractors in regard to the cost accounting principles that they follow, the Comptroller General's feasibility report [Ref. 31] on cost accounting standards and the

law that created the Cost Accounting Standards Board (Public Law 91-379) both provide "do's" and "don't's" for uniformity specifications. The following is a listing of those "do's" and "don't's" as perceived by the industry member of the Cost Accounting Standards Board [Dana, 1972, p. 93].

a. Don't prescribe a single method.
b. Don't eliminate diversity in the way contractors do business.
c. Don't be so specific as to try to recognize all possible situations.
d. Do establish criteria for the use of alternative methods, or do narrow the use of alternatives when criteria cannot be established.
e. Do take into account the probable cost of implementation compared to the probable benefits of new standards.
f. Do support each new standard with conclusive empirical data derived from adequate research.

Robert N. Anthony, a distinguished professor, former Government executive, and a consultant to the Cost Accounting Standards Board, has indicated that there are two sequential stages in the development of standards [Harvard Business Review, May 1970, pp. 125-128]. The first stage should be the development of a few underlying, basic concepts; the second should be the development of standards based on those concepts. He emphasized that the development of detailed rules and procedures is not properly a part of this effort. The first step should provide in broad terms what total costs incurred in an accounting period should include. The next step in the conceptual foundation stage should provide how this total cost is to be assigned to the several cost objectives of that period. Principal components of the total costs incurred in a period which should be considered are (i) types of resources for proper inclusion, (ii) pricing of these resources, and (iii) measurement of the amount applicable to a single period for resources that provide services to more than one accounting period. Anthony pointed out that attention should also be given to materiality, consistency, the definition of reasonableness, and the cost of capital.

In determining how to divide the total cost among the several cost objectives, Anthony suggested that consideration first be given to the definition of direct costs so that it will include as many cost elements as possible, thus leaving a small indirect cost category. He suggested that the solution to the problem rests in identifying what physical inputs should be treated as direct and then deciding how to price those inputs. The second consideration concerns providing a fair share of indirect costs to contracts. This entails specifying the meaning of homogeneous pools and deciding among the possible ways of allocating the total of each pool to cost objectives. A possible way of governing the method of allocating the total cost in a pool to the relevant cost objectives is that of arranging the methods of allocation in a conceptual desirability hierarchy and specifying that the most desirable method that is feasible in the circumstances be applied. The residuals would consist of costs for which no logical basis for allocation existed; this pool would undoubtedly contain some G&A costs.

After the few broad concepts have been developed, standards for individual elements of cost can be set. Anthony submitted that each topic for a standard should define alternative circumstances that warrant different methods of cost assignment and should state the method or methods appropriate under each of the circumstances.

If the assumption is made that the conceptual stage for cost accounting standards has been completed and that the "do's" and "don't's" of the law and the GAO feasibility report are valid and capable of being practically applied, then a cost accounting standard for IR&D and B&P costs can be developed. From the discussion of the allocability of IR&D and B&P costs earlier in this chapter, it is evident that the areas of concern

are the composition of costs in the IR&D and B&P pools, the methods of their allocation, the bases for their distribution, and resolution of when these costs should be expensed and capitalized.

The IR&D and B&P questionnaire sought answers to problems that are associated with cost accounting standards. Perceptions on the subject are indicated as follows:

a. Statement: There is need for explicit guidance on composition of IR&D and B&P costs and the allocation of these costs to specific cost objectives. Response: only 33 percent of industry agreed while 72 percent of Government agreed.

b. Statement: A cost accounting standard on IR&D and B&P costs should deal only with criteria and policies. Response: 93 percent of industry and 67 percent of Government agreed.

c. Statement: A cost accounting standard should require that each contractor establish and adhere to a reasonable IR&D and B&P cost policy rather than a uniform policy. Response: 93 percent of industry and 56 percent of Government agreed.

d. Statement: A cost accounting standard for IR&D and B&P should address the classification, accumulation, and allocation of IR&D and B&P costs. Response: 57 percent of industry and 83 percent of Government were in favor.

e. Statement: IR&D and B&P costs should be handled as independent issues when formulating cost accounting standards. Response: 77 percent of industry and 72 percent of Government agreed.

The questionnaire results again indicate that there is disagreement between industry and Government. However, there appears to be a consensus that a possible cost accounting standard should not be too specific, that it should deal with policies rather than procedures, and that it

should consider the classification, accumulation, and allocation of IR&D and B&P costs. It is of note that the majority feel that IR&D and B&P costs should be separate subjects with respect to forthcoming cost accounting standards.

Anthony [Ref. 3] suggested that a hierarchy of allocation methods may be desirable for distributing the total accumulated cost. However, the questionnaire asked if it would be desirable for the Government to establish a hierarchy of allocation methods for the selection of an appropriate allocation base, founded on achieving the most realistic representation of the beneficial or causal relationship that is practical in the circumstance. Only 33 percent of industry and 44 percent of Government respondents agreed with the idea.

Present Department of Defense policy is to allocate IR&D and B&P costs on the same basis as the general and administrative (G&A) expense grouping of the profit center in which such costs are incurred. The questionnaire results indicated that this method is overwhelmingly acceptable; 87 percent of industry and 83 percent of Government respondents agreed with this procedure.

Investigating further, the questionnaire sought to discover if IR&D costs could be identified with the correct cost objectives. The questionnaire stated that it is practical to make a preponderant identification of IR&D to the segment or segments of the organization which are likely to benefit. A difference of opinion exists, as the survey replies show that only 37 percent of industry agreed while 61 percent of Government considered the statement correct.

IV. ALLOWABILITY OF IR&D AND B&P COSTS

Allowability means that a cost may be charged to a contract and included in the total price of that contract. It is a procurement concept which affects contract price in negotiated procurements, where the determination of a fair and reasonable price is made on tha basis of cost analysis. To allow or not to allow IR&D and B&P costs is a question that has long occupied the minds of Government procurement decision-makers. Another is: if IR&D and B&P costs are allowed, what should be the equitable way to determine the allowance?

The past Department of Defense (DOD) position on these questions is indicated by the following statement [Vance, 1964]:

> It is the policy of the Department of Defense that we should pay our fair share of a contractor's normal and reasonable costs, including its independent research and development costs, with the Government acquiring no greater rights as a result than accrue to any other customer buying the contractor's products or companies predominantly engaged in commercial work. We believe that this policy is most likely to assure a continuing flow of new technology of importance to the national defense.

A further statement of the same era amplifies the Defense Department's position [Fubini, 1964]:

> In view of the basic presumption in favor of paying the contractor's necessary costs of doing business, independent research and development costs should continue to be allowed unless a positive basis for disallowance can be clearly established. Since a company must charge prices that cover its costs, the burden of proof must be carried by those who would propose that the Government pay prices that do not fully cover the contractor's costs.

However, since that time, doubt has arisen as to whether or not there have been proper controls placed on negotiated contracts to ensure fairness and reasonableness.

Senator Proxmire, in 1969, introduced to the Senate a bill [Senate Bill 3003, 1969] that was to provide for more effective control over the

expenditure of funds by the Department of Defense and the National Aeronautics and Space Administration (NASA) for IR&D and B&P costs. For negotiated contracts, the bill would not have allowed costs for research and development unless provision for these costs was specifically included in the contract. For any contract, no R&D costs would have been allowed unless they provided a direct or indirect benefit to the work performed under the contract.

Under S.3003, the cost of preparing successful or unsuccessful bids or proposals for negotiated contracts would have been allowed if the subject matter was applicable to the program of the agency concerned. However, the allowed amount was not to exceed one percent of the direct material and direct labor costs of the contract to be performed.

In hearings before the Senate Armed Services Committee in 1970 [Senate Armed Services Committee Hearings, 1970, pp. 1641-75], Senator Proxmire charged that the Government received no direct or specific product or benefit related to its needs and also received no license, patent, royalty or right for the money it expended for IR&D. He said that IR&D expense was not directly authorized by the Congress and that it was a "back-door boondoggle" whose benefits to the Government and the taxpayers were indirect, transitory and evanescent at best and were nonexistent at worst.

With regard to the arguments that IR&D is necessary to provide for a modern industrial technology base, the Senator suggested that the country's industrial capacity would be far stronger if the Government determined precisely what R&D was needed, converted the IR&D funds to regular R&D contracts, and then had these contracts performed by companies not presently conducting defense business.

Senator Proxmire felt that the worst possible thing that could happen would be to have a single, Government-wide R&D system modeled on the DOD-

NASA system. He believed that the effect of such a system would be similar to that of "universalizing sin." He stated that to continue paying for IR&D for a firm's commercial and indirect and general research was illegal. Further, he felt that industry rather than the Congress was being allowed to determine and shift national priorities.

The IR&D and B&P questionnaire attempted to obtain opinions regarding some of Senator Proxmire's charges. The results of the survey indicate the following:

a. 100 percent of the contractors strongly agree that IR&D and B&P effort is in the nations's best interest; 77 percent of the Government personnel either agreed or strongly agreed.

b. 52 percent of the contractors disagreed and 82 percent of the Government personnel agreed that there are possible inequities to the Government when contractors develop products under IR&D programs in the defense/space cost centers and market them in commercial centers.

c. 64 percent of the contractors disagreed and 88 percent of the Government personnel agreed that the Government should be entitled to information and royalty-free rights to any invention arising from IR&D projects fully or partially supported by the Government.

d. 90 percent of the contractors and 41 percent of the Government personnel agreed that a contractor's performance of IR&D generally results in reduced costs to the Government.

From the above questionnaire results it can be observed that the perception of IR&D and its effects greatly depends upon which side of the negotiating table one occupies.

To make the subject of allowability of IR&D and B&P costs more meaningful, the following pages will address allowability in further detail.

Then, the related subjects of "reasonableness" and "relevance" will be discussed, followed by a consideration of the Commission on Government Procurement's recommendation for these costs.

A. ALLOWABILITY

Allowability, in most cases, is expressly provided for in regulatory or contractual provisions. A contracting agency may include in its contract terms or in its procurement regulations a provision that it will refuse to allow certain costs incurred by contractors that are unreasonable in amount or contrary to public policy.

To further understand the meaning of an allowable cost, the following is a proposed definition of an unallowable cost [Federal Register, Vol. 38, No. 61, 30 Mar. 1973, p. 8279]:

Any cost item(s), or the total costs of any organizational activity, which because of applicable laws, regulations, and/or contractual agreements cannot be included as costs used for pricing, billing, or settlement of a particular prime contract or subcontract.

Public Law 91-441, Section 203 [84 Stat. 904 (1970)], requires that funds authorized for appropriation to DOD are not to be made available for payment of IR&D and B&P costs unless the work for which payment is made has, in the opinion of the Secretary of Defense, a potential relationship to a military function or operation and unless conditions are met for reasonableness, which, in turn, is determined by either advance agreement or by use of a formula based on a company's history of IR&D and B&P costs.

A contractor's costs of IR&D are allowable as indirect costs provided that they are allocated to all of his work. A contractor's B&P costs are allowable because they are considered a part of the cost of doing business with the Government. The B&P costs are allowable for both the

successful and the unsuccessful bid as an indirect cost [DPC 90, 1 Sep. 1971]. (It is of interest to note that 84 percent of the combined Government and contractor population surveyed in the questionnaire was in favor of allowing both successful and unsuccessful bids.)

Policy is inconsistent among the various Government agencies as to the allowability of IR&D and B&P costs. This policy variance results primarily from whether the agency's reasoning is dominated by concern for production procurement or by concern for R&D support. Agencies that procure mostly products tend to be more restrictive in allowing IR&D, whereas research-oriented agencies are typically very liberal with IR&D allowances. There is strong justification for each type of policy in its respective circumstances. However, injustice occurs when a policy is applied outside of the circumstances for which it was designed. There appears to be a need to develop a Government-wide policy which will fit the varying circumstances of procurement, make clear what is right and when, eliminate contradictory authority, and clearly establish the regulations.

In the present DOD regulations for allowability, no attempt has been made to make a distinction between "research" and "development," nor has there been an attempt to differentiate between "basic" and "applied" research or "concept formulation studies." This present policy differs from past policies wherein there was a differentiation between these various categories. Independent research costs formerly were allowed, provided they were allocated to all work of the contractor; independent development was allowed to the extent that the development related to the product lines for which the Government had contracts with the contractor, and provided that these costs were allocated to all work of the contractor for such product lines [ASPR Section 15-205.35, 1959].

Restrictions on allowance of IR&D and B&P have been met with sustained resistance by industry. Almost unanimously, R&D performers believe that some independent and discretionary R&D funds are essential to efficient performance and to long-term survival for the organization. The degree to which a company maintains an IR&D program is related to the company's assessment of the impact of future technology on its ability to market its products. However, under negotiated procurement circumstances, the Government determines the size of the IR&D program in which it will participate and thus determines allowability.

The proper handling of cost overruns above the allowed ceilings has been an item in the allowance controversy. The IR&D and B&P questionnaire sought opinions on this subject. The following responses indicate a large division of opinion between industry and Government representatives:

a. Statement: Presently there are sufficient guidelines for excluding IR&D overruns from indirect costs. Response: 80 percent of industry agreed while only 22 percent of Government personnel agreed.

b. Statement: IR&D overruns should be included in indirect costs for allocation to both commercial and Government work. Response: 77 percent of the contractors and 22 percent of Government agreed.

The handling of these specific unallowable costs come under the domain of a recent cost accounting standard. This standard requires that, where the total of the allocable and otherwise allowable costs exceeds a ceiling-price provision in a contract, full direct and indirect cost allocation is to be made to the contract cost objective, in accordance with established cost accounting practices and standards which regularly govern a given entity's allocations to Government contract cost objectives. It further indicates that, in any determination of an unallowable

cost overrun, this amount is to be identified in terms of the excess of allowable costs over the ceiling amount, rather than through specific identification of particular cost items or cost elements. The standard provides that specific identification of unallowable costs is not required in circumstances where, based upon considerations of materiality, the Government and the contractor reach agreement on an alternate method that satisfies the purpose of the standard [Federal Register, Vol. 38, No. 172, 6 Sep. 1973, p. 24199]. This standard for unallowable costs, effective 1 January 1974, should provide more clarity in an area that has been a source of confusion in the past.

With regard to whether or not DOD policy on IR&D and B&P costs is such that it encourages companies to conduct independent research and development, the questionnaire results indicate that both industry and Government personnel believe that it does; 76 percent of those polled agreed that there is encouragement while 24 percent disagreed. Hence, DOD restrictions on the allowance of these costs appears not to be very detrimental to the effort.

IR&D and B&P costs have traditionally been allowed by DOD and have been treated as an indirect cost item or an element of a company's overhead. However, techniques other than cost recovery through overhead allocation have been considered as alternatives to this traditional method. These alternatives include (i) recovery by means of a direct contract and (ii) recovery by means of profit margin.

1. <u>Direct R&D Contracts</u>

A chief proponent for the use of R&D contracts in place of IR&D funds has been Senator Proxmire. He stated that, if the Government needed further to fund pure research, it should be accomplished through funds

furnished by the National Science Foundation [Senate Armed Services Committee Hearings, 1970, p. 2061].

In response to those who recommended replacement of IR&D funds with direct R&D contracts, Dr. John S. Foster, Jr., Director of Defense Research and Engineering, stated that the use of direct contract R&D in this expanded role would remove most of the advantages that make IR&D desirable. He emphasized that the contract R&D programs of the DOD were projects that were evaluated and selected from among a much larger number of possible alternatives. Making the correct choice of the best projects is difficult because the number of needs and possible solutions is large, funds are limited, and proper management necessitates that the possibility of error be considered. Dr. Foster felt that a portion of R&D programs, albeit small, should remain independent. He pointed out that the difficulty of choosing a course of action is an old story to R&D enterprises and the usual solution is a combination made up of projects that are controlled from the top down, projects that are proposed from the bottom and approved at the top, and projects that are initiated and controlled at the bottom. Statistics indicate that IR&D allowed on defense contracts is a small percentage (about 4 percent) of the DOD contract R&D budget, is centrally controlled by the agency with respect to funding and general subject area only, and is not subject to the same detailed management reviews as the 96 percent balance of R&D expenditures. Thus, it is aimed at exploiting the independent, original and creative thinking of contractors and broadening the support base available to the Defense Department. Dr. Foster's view is that both private initiative and directed developments are necessary, but at different times and in different places in the development cycle; the genius of the American industrial

system is that it is geared to use the creativity of all participants [Senate Armed Services Committee Hearings, 1970, pp. 1958-59].

The number of IR&D projects performed is staggering. Cognizant military agencies' bookshelves are filled with volumes of contractors' brochures describing the many projects; many more projects are conducted by the multitude of smaller contractors. The Government could not accomplish all of the reviews and comparisons required to contract directly for IR&D without substantially increasing the resources it noe devotes to the technical evaluation and contracting function. Additionally, direct contracting for the many IR&D projects would involve a substantial time-lag becuase of time required for review of projects, preparation of the budget, congressional action, and subsequent contractual actions. The projects would tend to be narrower in scope due to the increased requirement to conform to specific DOD desires and, hence, technological innovation would be stinted.

Industry has emphasized that Government contracted R&D cannot effectively substitute for independent R&D because the Government cannot conceive all the ideas worth following up with R&D effort; it cannot effectively act as sole judge for all embryonic ideas; and it cannot practically administer such a nationalized effort unless, of course, the technical experts now working for industry are transferred to Government payrolls [Senate Armed Services Committee Hearings, 1970, p. 1812].

Another response from industry is related to the suggestion that Government should more closely specify and control R&D for the purpose of cost reduction. Industry stresses that the Government is not buying IR&D but is buying goods and services, the price of which includes a fair portion of the applicable IR&D and other indirect costs. They point out that there is no choice of either allowing IR&D as overhead or contrasting

for it directly. They believe that the choice is that of either the Government accepting IR&D as a necessary business expense or denying that IR&D is of value to the continuing national technological superiority [AIA White Paper, 1969, p. 7].

The DOD feels that it would be impractical to channel funds now allowed for IR&D to the National Science Foundation because it would mean the loss of the generation of technical ideas. They believe that the drive to limit expenditures would be misdirected if it resulted in stifling the flow of industry R&D aimed at solving new problems [Senate Armed Services Committee Hearings, 1970, p. 1997].

The General Accounting Office (GAO) believes that direct contract support, as an alternative to IR&D, merits consideration. They have pointed out that this method could eliminate excessive and consequent waste of effort and provide assurance that projects of significant interest to the Government would actually be performed and that the Government would receive data and a royalty-free license to any invention arising from the work [GAO Report B-164912, 1970, p. 23].

The IR&D and B&P questionnaire asked addressees to indicate their most favored of the alternative ways to allocate or recover IR&D and B&P costs. The combined contractor and Government personnel response was as follows: Continuation of recovery through overhead allocation was selected by 79 percent; recovery via a direct contract or grant was chosen by 8 percent; and recovery through profit was selected by another 8 percent. None suggested other ways to allocate or recover these costs. Two respondents provided no opinion.

2. IR&D as a Profit Factor

It has been suggested that IR&D be treated as a profit factor instead of allowing it as an acceptable contract overhead cost. This

method would entail increasing the profit level sufficiently to reimburse contractors for their IR&D efforts. Proponents have emphasized that this approach would help ensure that contractors manage IR&D programs with the same concern for economy as they would have if they were in an actual competitive environment. They indicated that this approach would help assure that unsponsored R&D was actually something of potential value to the contractor and that it would help prevent build-up of unproductive effort. An additional advantage considered is that of minimizing the amount of administrative effort required by Government when using this approach [GAO Report B-164912, 1970, p. 23].

A DOD study group offered objections to treating IR&D as a profit factor rather than as an allowable cost [CODSIA letter to GAO Defense Division Director, 23 Sep. 1968, Attachment H]. There might be a tendency to apply the same profit factor for IR&D to all contractors, and this would be inappropriate because of the varying degrees of participation in R&D work in different industries and firms. It would be necessary to increase the rate of profit to cover the agreed amount of IR&D, but the Government negotiators might not apply a fee allowance equitably among different contractors; or the profit rate might be raised beyond the statutory limits. Allowance of IR&D costs as a profit element might deprive the Government of assurance that the contractor actually would continue to perform IR&D. The GAO felt that the objections presented were not insurmountable and that many would be equally applicable to other controversial items which were considered in negotiating contract prices.

Industry feels that this approach is unrealistic, in that increased cost disallowances in negotiated procurement serve, in practice, only to reduce profit margins, not to increase them. They fear that contractors would be forced to pay for R&D costs out of funds that are their reward

for the risks to which the firms expose their assets. They submitted that declarations of intent to allow higher profits are easily and often made at the policy levels but that, unfortunately, pious words about increased profits tend to remain just that and find few supporters among Government negotiators. They noted, however, that this approach would presumably surrender the controls which are inherent in treating IR&D as an element of cost and would recognize that competitive forces and negotiation pressure would keep the profit margins under control [Senate Armed Services Committee Hearings, 1970, p. 1869].

The Department of Defense feels that the profit approach is open to serious question because they would have no practicable way of controlling the contractor's use of profit dollars once the contractor agrees to the profit. Thus, there would be no way for DOD to prevent the contractor from using profit dollars for commercial IR&D of from not performing IR&D at all and, thereby, increasing current profit. On the other hand, overhead costs would be subject to audit, except for firm fixed price contracts, and would not be paid if they were not incurred [Senate Armed Services Committee Hearings, 1970, p. 1994].

The profit-factor method would recognize that IR&D and B&P costs are applicable to future rather than current operations. There would be no disputes over disallowance of costs because there would not be any consideration of IR&D and B&P costs; there would only be consideration of the amount of the profit margin allowed. Contractors would be required to consider IR&D and B&P effort as a trade-off between investment in the future and maximum current earnings.

DOD has no reliable means of determining accurately what actual contract costs are and, as a consequence, what actual profit is. They are wholly dependent on the contractor's records. Thus, DOD could not be sure

that it had actually awarded the contractor through his profit the compensation for IR&D effort that it had intended when the contract was negotiated.

B. REASONABLENESS

A cost is considered reasonable if, in its nature or amount, it does not exceed that which would be incurred by an ordinarily prudent person in the conduct of competitive business. The reasonableness of specific costs should be examined with particular care in connection with firms or separate divisions thereof which may not be subject to effective competitive restraints. What is reasonable depends upon a variety of considerations and circumstances involving both the nature and amount of the cost in question. In determining the reasonableness of a given cost, consideration should be given to the following questions:

a. Is the cost of a type that is generally recognized as both ordinary and necessary for the conduct of the contractor's business or the performance of the contract?

b. Are the restraints or requirements which are imposed by such factors as sound business practices, arm's length bargaining, federal and state laws and regulations, and contract terms and specifications applicable in the particular instance?

c. Would a prudent businessman allow the cost under the circumstances, considering his responsibilities to the owners of the business, his employees, his customers, the Government, and the public at large?

d. Are there significant deviations from the established practices of the contractor which may unjustifiably increase contract costs [ASPR Section 15-201.3, 1973]?

Effective price competition ensures the reasonableness of a prospective price. If competition is absent, or is based on technical proficiency rather than price, the Government must beware, because a contractor's costs may not reflect the most efficient and economical management of the business. Moreover, a contractor free of competitive pressure will seek to extract as much profit as the buyer is willing to pay.

1. Advance Agreements and Formulas

The Congress dictated through Public Law 91-441 [Ref. 71] that reasonableness for the largest contractors was to be determined by use of advance agreements. Defense Procurement Circular 90 [Ref. 22] implemented the congressional mandate. It states that any company which received payments, either as a prime contractor or subcontractor, in excess of $2 million from DOD for IR&D and B&P in a fiscal year is required to negotiate an advance agreement with the Government. This agreement establishes a ceiling for allowability of IR&D and B&P costs for the following year. Computation of the amount of IR&D and B&P costs, to determine whether the $2 million criterion was reached, is to include only those recoverable IR&D and B&P costs allocated during the company's previous fiscal year to all DOD prime contracts and subcontracts for which the submission and certification of costs or pricing data was required in accordance with 10 U.W. Code 2306(f). The computation is to include full burdening in the same manner as if the IR&D and B&P projects were contracted for, except that G&A is not to be applied. Contractors which meet the $2 million threshold are to submit technical and financial information to support their proposed IR&D and B&P programs in accordance with guidance furnished by the Defense Department's IR&D Technical Evaluation Group. Results of the technical evaluation performed by this group, including

determination of potential military relationship, are to be made available to the contractor by the cognizant service's central office. Within the advance agreement ceiling limitations (maximum dollar amounts of total IR&D and B&P that will be allowable), contractors are not required to share IR&D and B&P costs with the Government.[3] In negotiating a ceiling, in addition to other considerations, particular attention is to be paid to such factors as [DPC 90, 1 Sep. 1971]:

a. The technical evaluation of the IR&D Technical Evaluation Group, including the potential relationship of IR&D projects to a military function or operation,

b. Comparison with previous year's programs, including the level of the Government's participation, and

c. Changes in the company's business activities.

For companies not required to negotiate advance agreements, the reasonableness of allowable IR&D and B&P costs are established separately by use of an historical cost-based formula, either on a companywide basis or by profit centers, computed as follows [DPC 90, 1 Sep. 1971]:

a. Determine the ratio of IR&D (B&P) costs to total sales (or other base acceptable to the contracting officer) for each of the preceeding three years and average the two highest of these ratios; this average is called the IR&D (B&P) historical ratio.

b. Compute the average annual IR&D (B&P) costs, using the two highest of the preceding three years; this is called simply the "average".

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[3]Cost sharing from the first dollar of cost, as well as a cost ceiling, was required in past regulations to provide motivation to the contractor for more efficiency. The effect of the cost-sharing agreement and a dollar ceiling was to require the contractor to spend a greater amount on his IR&D program than the agreed ceiling if he desired to recover the maximum Government share.

c. IR&D (B&P) costs for the center for the current year which are not in excess of the product of the contractor's actual total sales (or other accepted base) for the current year and the IR&D (B&P) historical ratio -- hereafter called the "product" -- are to be considered allowable only to the extent the "product" does not exceed 120 percent of the "average." If the product is less than 80 percent of the "average," costs up to 80 percent of the "average" will be allowable.

d. Costs which are in excess of the ceiling computed in (c) are not allowable, except where the ceiling computed for B&P (IR&D) cost is reduced in an amount identical to the amount of any increase over the IR&D (B&P) ceiling computed in (c).

Prior to enactment of Public Law 91-441 and DPC 90, the DOD conducted a thorough and detailed review of the whole area of IR&D and B&P management and control. They looked at changes that could increase control without removing or unduly restricting the features of flexibility and inventiveness upon which the system depends for its value. They selected the dual plan of the negotiated advance agreement and the DOD-developed formula because they felt it would satisfy both congressional and DOD concerns while keeping alive the vital independent nature of this work. An outline of their policy is given below [Senate Armed Services Committee Hearings, 1970, pp. 1963-64]:

a. Use individually negotiated advance agreements for the control and reimbursement of IR&D and B&P costs for approximately 100 of the larger defense contractors. Such agreements, after a formalized, detailed technical review of the program, establish a separate dollar ceiling for the DOD's reimbursement of each of these costs but allow the contractor to combine the individual amounts into a single pool if he chooses. The requirement to negotiate an advance agreement is enforced

by automatically establishing a low threshold for recovery of costs where no advance agreement exists.

b. Strengthen technical review and evaluation of contractor IR&D programs (currently established under DOD Instruction 5100.66). Establish uniform review and evaluation procedures for use throughout the DOD. The system requires review of a contractor's individual applicable projects and takes both his accomplishments and his proposed plan into consideration.

c. A data bank is established to provide a centralized body of IR&D project costs and technical information which is available to the Government technical community at large.

d. Use the DOD-developed formula for control and determination of reasonableness of costs for the remaining large number of smaller companies who recover IR&D and B&P costs. This provides a workable system that can be uniformly applied -- one that assures results that can be easily monitored and adjusted as needed.

e. The military departments increase as necessary the support and resources needed to perform effectively the required IR&D technical reviews.

The Defense Department acknowledged that determination of "reasonable costs" was the major problem in formulating the policy. The DOD and industry groups worked to achieve an acceptable and equitable solution. They reasoned that IR&D and B&P are so intimately related and so interdependent that actions taken should be equally applicable to both, that the amount of IR&D and B&P costs to be accepted by the Government should be determined by a formula which uses a company's historical use of IR&D or B&P costs and sales dollars, and that either the Government or industry

should be permitted to appeal the allowance produced by the formula in extraordinary situations [Senate Armed Services Committee Hearings, 1970, p. 1955].

Industry considered the formula approach for the determination of reasonableness to be acceptable. They felt that the formula should be based on a combination of previously incurred contractor costs and projected sales for determination of the ceiling amount of IR&D and B&P costs to be allocated to Government contracts for a prospective period. They believed that this approach would be applicable for all contractors, regardless of size, except that, in rare and unusual circumstances, either the Government or the contractor could deviate by using negotiation and advance agreement. Industry concurred that contractors should be required to describe their technical programs for review and evaluation by the Defense Department on an annual basis. They felt that this process would serve as a means of enhancing communications between contractors and the Government and that it would provide a method of dissemination of non-proprietary information throughout the Government [Senate Armed Services Committee Hearings, 1970, p. 1821].

A contractor might want to appeal the formula result in situations where historical data were not available or where there had been an unusually rapid expansion or compression of the formula amount due to large increases or decreases in sales volume in a particular profit center. Additionally, there could possibly be a case wherein Government solicitation necessitated so large an expenditure that application of the formula resulted in disallowance of most of the contractor's B&P expenses.

Industry views advance agreements as having potential for meeting mutual interests of both Government and industry. However, they feel that, where the use of such agreements is "encouraged" (and tends to

become mandatory), the concepts of "agreement" and "independence" of IR&D and B&P actually become impaired and, to an extent, cease to exist. Hence, industry believes that violation of the principle of independence must be avoided [AIA White Paper, 1969, p. 11].

An advance agreement could be made on any of several bases. The agreement could be made by accepting as reasonable the allocable portion of costs incurred in pursuance of specific projects; it could be established as a given percentage of costs incurred, whereby the Government's allocable share of the stipulated percentage of such costs would be accepted as reasonable; or it could be established as a maximum dollar limitation on IR&D and B&P costs. The Congress has stipulated that the latter method be used.

In practice, IR&D and B&P cost ceilings for advance agreements are characterized by some form of cost sharing, because the agreements do not necessarily allow recovery of the total costs incurred by contractors. This feature tends to provide incentive for the contractor to be very cost conscious in pursuit of IR&D and B&P related work.

In response to the desire of the Congress, DOD has included a provision which, in effect, links the two costs by permitting the contractor to recover costs for IR&D above the negotiated ceiling, provided that recovery of B&P costs covered by the same agreement is decreased below its ceiling by a like amount; the B&P costs can be increased by decreasing IR&D in a like manner. The ceilings effectively limit reimbursement for the combination of IR&D and B&P costs. The linkage is considered necessary because Government negotiators have, in the past, had difficulty in determining where one cost ended and the other began. Additionally, a GAO investigation discovered that, when a reasonable agreement for IR&D costs had been consented to by both the contractor and the

Government in a situation where a ceiling was required for IR&D costs but not for B&P costs, the costs of B&P greatly increased in order to accommodate the IR&D costs which were in excess of the agreed-upon ceiling [GAO Report on Review of Bidding Efforts, 1967].

The greatest general concern of industry with respect to IR&D and B&P cost ceilings appears to be that there is no guarantee that contractors' total expenditures for the IR&D or B&P effort will be recognized by the Government's methods of determining reasonableness. Industry's feelings are exemplified by the following statement [CODSIA letter to ASPR Committee Chairman, 25 April 1968]:

> The volatile nature of the business and especially the needs generated by rapid technological change dictate an arrangement whereby any ceilings should be viewed more in the context of quantitative criteria as opposed to impenetrable boundaries outside of which contractor activity would not be recognized as a necessary and reasonable cost of doing business. An inflexible ceiling would inhibit the exploitation of technical breakthroughs.

A further concern of industry relates to the fact that contractors normally employ a relatively stable level of effort for IR&D and the level is directly controllable by them. On the other hand, B&P costs tend to fluctuate and depend upon the nature and timing of customers' demands. A surge of B&P requests could cause serious problems for the relatively stable IR&D program, because the contractor could attempt to remain within the combined ceiling and thus spend funds for B&P that were previously designated for IR&D use.

The IR&D and B&P questionnaire responses indicated prevalent feelings about cost ceilings. These results are as follows:

a. 33 percent of the contractors believed that both IR&D and B&P costs pools should have ceilings; 88 percent of the Government personnel agreed that both should have ceilings.

b. 96 percent of the contractors but only 35 percent of the Government personnel felt that contractors should not be required to share IR&D costs within a ceiling limitation determined by an advance agreement.

c. 100 percent of the contractors but only 35 percent of the Government personnel felt that provision should be made to permit the contractor to increase recovery of costs for either IR&D or B&P above the individually negotiated ceilings, provided that recovery of costs for the other was decreased below its ceiling by a like amount.

Hence, a great dichotomy of opinion is again observed between the views of contractors and the views of Government contracting personnel.

2. Basis for Negotiation

The importance of having a basis for the determination of reasonableness clearly defined is indicated by a decision of the Board of Contract Appeals [Appeal of Technical Communications Corp., ASBCA No. AS-11931, 67-2 BCA, August 1967]. In that case the contractor contested the Government contracting officer's decision to make the contractor pay 20 percent of the IR&D costs as an incentive to keep costs down. The board ruled that the contractor was entitled to reimbursement for a full 100 percent of its IR&D costs on two cost-plus-fixed-fee contracts because the Government could prove neither that the costs were unreasonable nor that it had agreed in advance with the contractor to share costs. Reference to this decision by the Board of Contract Appeals is made to emphasize that there is a need to reach an advance agreement. Contractors could conceivably refuse to enter into advance agreements and, therefore, put the burden of proof of reasonableness on the Government after costs had been incurred. Government needs to establish what the reasonable costs should be in order to prove whether or not actual costs are appropriate in amount.

If disallowances are made after the costs are incurred, the Government exposes itself to the charge that disallowances are based on hindsight and, hence, do not consider all the uncertainties that existed at the time the costs were incurred. The General Accounting Office had reported recently that most agreements are not negotiated before costs are incurred [GAO Report B-167034, 1973, p. 20]. They have made an excellent recommendation that calls for negotiating advance agreements either prior to cost incurrence or early in the contractor's fiscal year. The IR&D and B&P questionnaire indicated that both industry and Government personnel are in favor of this; 86 percent of the respondents agreed that is important for agreement to be reached in advance of the incurrence of costs in categories where reasonableness is difficult to determine.

The negotiation process is intended to be a very thorough and stringent process, designed to prevent unreasonable costs. The process is intended to be a deterrent to excess spending by providing an effective cost surveillance system. However, in attempting to control costs in order to ensure reasonableness, consistent negotiation procedures have not been evident. The GAO has found that, in many instances, the correlation between the factors considered and the dollar effect of the factors has not been evident; they also found that inconsistencies had resulted in inequities to some contractors [GAO Report B-167034, 1973, p. 23].

What are the most effective and practical techniques to use for determining reasonableness of these costs? The questionnaire asked this question and the response of the combined survey population indicated the following: 32 percent believed technical evaluation to be best; 10 percent felt industrial norms by industry group was best; 24 percent chose the use of an historical record for each contractor. The remainder

of the respondents chose a combination of the three methods or indicated other methods such as competitive pressure and sound management, evaluation of management including measurement of company profit and return on investment in defense work, historical record and realistic forecast, technical and cost evaluation, and treatment the same as for other overhead elements.

The Department of Defense's IR&D Policy Council has recognized the need for development of uniform negotiation guidelines, criteria and policies for negotiators. They have found that the factors considered in determining reasonableness of IR&D and B&P costs included a four year historical review and one to three year projections of the following data submitted by each contractor [GAO Report B-167034, 1973, p. 23]:

IR&D costs	Product line information
B&P costs	Mix of contracts
Sales	Burdening procedures
Allocation base data	IR&D technical effort
Customer mix	B&P technical information

Other information considered is as follows:

Departmental budgets
General business trends
Reliability of contractor estimates
Potential relationship of contractor program to DOD needs
Technical evaluation
Ceilings

The GAO reported that the use of these factors is basically subjective. This circumstance increases the probability of inconsistencies in practice. It is important that methods be developed for consistent measurement of these and other items so that uniform control of these costs can become a reality.

The IR&D and B&P questionnaire provided insight into the desires of industry and Government personnel. Responses were as follows:

a. Statement: Government agencies should establish guidelines that uniformly recognize, during IR&D and B&P ceiling negotiations, the technical quality of contractors' IR&D programs with reward or penalty, as appropriate. Response: 67 percent of industry and 78 percent of the Government personnel agreed.

b. Statement: Government IR&D administrative procedures should include pre-negotiation arrangements, brochure requirements, and the scope and nature of technical evaluations. Response: 77 percent of both industry and Government personnel agreed.

c. Statement: Where there is a lack of normal competitive restraints, IR&D must be subject to cost (but not technical control) to preclude excessive charges to the Government. Response: 67 percent of the contractors agreed and 72 percent of Government agreed.

d. Statement: A policy should be established by the Congress stating the extent to which and under what circumstances Government agencies should participate in the cost of contractors' IR&D and B&P efforts. Response: 83 percent of industry did not agree while 61 percent of the Government representatives agreed.

It is logical that negotiations for R&D work would necessarily include evaluation of the technical content. The difficult task which must be performed if any uniformity and consistency is to be obtained in determining reasonableness is associated with the measurement methods that must be determined and costs that must be included as a factor in the negotiation process. Industry is not happy with the thought that the Congress might provide the impetus for accomplishing these needs.

3. Contractor's Weighted Average Share of Cost Risk (CWAS)

The contractor's weighted average share of cost risk (CWAS) is a technique for determining and expressing numerically the degree of cost

risk (probability fo recovery) a contractor has assumed, based on an analysis of the mix of types of contracts which he has agreed to perform for his customers. This technique recognizes that all contractors do not have the same financial risk in arriving at decisions regarding expenditures of funds in meeting their contractual obligations. This concept is based on the premise that good management by industry, properly motivated to cost consciousness, can accomplish much more effective control of costs than can detailed review, control and audits by Government personnel. It recognizes that a contractor who accepts higher risk contracts has a greater financial motivation to exercise prudent business judgment in the performance of such contracts. The specific objectives of CWAS are as follows [ASPR Section 3-1002, 1973]:

(a) to furnish a measure of an individual contractor's risk motivation, as provided by types of contracts, to conduct his business prudently and with maximum economy;

(b) to offer additional inducement to a contractor to accept higher risk type contracts;

(c) to minimize the extent of Government control, including controls exercised through Department of Defense prime contracts and subcontracts thereunder, thereby reducing Government costs;

(d) to provide a simple, uniform procedure for determining a contractor's assumption of cost risk that can be applied equitably to all defense contractors who desire to participate by voluntarily submitting pertinent data;

(e) to provide a means for directing audit and other Department of Defense management efforts to those areas where they are most needed because of the greater degree of Government risk; and

(f) to provide a basis for determining that indirect costs incurred during the applicable period by a contractor whose CWAS rating is above a predetermined threshold are reasonable.

The CWAS technique is applicable to all contractors of the Department of Defense on a voluntary basis. A contractor desiring to participate in this program may do so by determining his own CWAS rating according to the prescribed procedure. In order to establish an initial CWAS rating,

the contractor must develop cost-incurred data at the close of his fiscal year. These data must be based on his Government business, broken down by types of contracts, and on his entire commercial business. Government competitive firm-fixed-price contract costs may be combined with commercial contract costs at the option of the contractor. The contractor must submit similar data on an annual basis if he desires to retain his CWAS rating.

The CWAS rating given to a contractor depends upon the riskiness of his contracts. To understand the rating system more fully, one may examine the limits of the spectrum. Under a cost-plus-fixed-fee contract, where full cost risk is assumed by the Government (assuming no unallowable costs), the contractor is credited with zero cost risk. Under competitive firm-fixed-price type contracts where the contractor has full cost risk, he is credited with 100 percent of the cost risk. In between these limits are a full range of risk associated contracts. The CWAS technique has a system of values to be applied within various possible ranges of cost risk distribution, thus providing an easily computable cost risk rating.[4] If the profit center within which the cost was incurred has a CWAS rating of 65 points or higher, 35 points or more of which rating were derived

[4]The following is a simplified example of computing a CWAS rating:

Type of Contract	Prior Year's Costs Incurred	Percentage Factor	Contractor's Dollar Risk
Cost-plus-fixed-fee	$ 300,000	0	$ 0
Cost-plus-incentive-fee	500,000	15	75,000
Firm-fixed-price (competitive)	200,000	100	200,000
Commercial	400,000	100	400,000
	$1,400,000		$675,000

$675,000 ÷ $1,400,000 = 48.2 CWAS Rating.

from competitive firm-fixed price contracts or commercial sales, the reasonableness of the cost will not be questioned. However, if the profit center within which the cost was incurred has a CWAS rating of 50 or higher but less than 65, the rating is given at the discretion of the contracting officer [ASPR Section 3-1005, 1973].

The advantage to contractors using the CWAS technique is that, by using it and having sufficient cost risk, the contractors may be excused from the determination of reasonableness of certain cost elements for purposes of allowing reimbursement of those costs under cost type contracts. They may also be excused from certain administrative type contracts which would otherwise be applicable to their operations.

The cost principles in ASPR Section 15-205 carry an indicator of either a "(CWAS)" or a "(CWAS-NA)." Those costs principles which are subject to CWAS are preceded by the "(CWAS)" indicator; those principles to which CWAS does not apply are preceded by the "(CWAS-NA)" indicator. The cost principles for IR&D and B&P costs have been given indicators. IR&D and B&P costs for which the historical formula is required carry the "(CWAS)" indicator. The situations which use the advance agreement are not applicable for the CWAS technique [ASPR Section 15-201.3, 1973].

The use of the CWAS technique appears to have definite advantages for both the Government and the contractors. It tends to equalize treatment between contractors, to constrain costs within the bounds of reasonableness, and to limit the involvement of Government in the internal affairs of the contractors.

Industry objects to CWAS not being allowed for all contractors, regardless of their size. They feel that costs of CWAS qualified and approved contractors should automatically be determined reasonable,

regardless of whether the advance agreement of the formula criterion applies [CODSIA letter to ASPR Chairman, 26 June 1968].

It is suggested, in reply to the industry position, that Government officials responsible for public funds feel a need for close supervision of the large amount expended by contractors subject to advance agreements. Hence, unlimited acceptance of costs expended for IR&D and B&P by the contractors who attain the required CWAS threshold could result in a major drain of public funds.

C. RELEVANCE

There is great inconsistency in the Government's policy with regard to IR&D costs. The Department of Defense had a policy for a number of years that was very broad, in that allowed IR&D needed only to be related to the mission of the Defense Department. Public Law 91-441 Section 203, has required the DOD to determine the potential military relationship of a function or operation before allowing funds to be used by the contractor. The Atomic Energy Commission (AEC) requires that a contractor's project must be relevant to the contract then under consideration. The Department of Health, Education and Welfare (HEW) has a policy of allowing no IR&D as a separate item of contractor overhead; HEW's policy is to fund fully projects of the contractor which are of interest to the department. In contrast, the National Science Foundation, whose business is practically 100 percent R&D, places no restrictions on the IR&D programs of its contractors.

A procurement policy which limits Government support of IR&D only to that effort which is relevant to a Government mission or contract has some influence on a company's management policies. Some companies, desiring Government support, are motivated to propose IR&D programs which

will gain maximum acceptance by Government agencies. As those companies perform IR&D over the years, their production potential becomes locked to agency missions and they have less ability to move freely into the general commercial market place. As Government missions change or programs decrease in dollar value, these companies may experience a number of problems in trying to convert their capabilities to commercial products. Hence, the Government's relevancy policy can have a significant effect on the ability of companies to move to other markets.

Industry believes that it is frequently very difficult to demonstrate a relationship, direct or indirect, between the IR&D cost element in a contract price and the product being bought. They point out that, while there is some time lag in the recovery of B&P costs, it is nowhere near as great as in the IR&D area; and there usually is a clearly identifiable relationship between the B&P costs element in a given negotiation and the product being purchased. On the other hand, they feel it is important to remember that the source of IR&D funds received today -- whether Government or commercial -- depends on the nature of the products researched and developed years ago and sold today. That is to say, there is a considerable lag between the receipt of funds for IR&D through the sale of a current product and the ultimate sale of a future product developed through the use of that current IR&D support. Therefore, it is rare that there is any clearly identifiable relationship between the IR&D cost element in a given negotiation and the product being purchased [Senate Armed Services Committee Hearings, 1970, pp. 1801-03].

The GAO admits that matters of relevancy and benefits are somewhat judgmental in nature. They can also see how it is difficult to define with exactness the detailed functions and operations of a military organization. However, they do not see why appropriate criteria cannot be

developed to provide the necessary guidance [Senate Armed Services Committee Hearings, 1970, p. 1919].

The IR&D and B&P questionnaire addressed the subject of relevancy and the survey results are as follows:

a. 91 percent of the contractors and 71 percent of the Government personnel disagreed with the statement that reimbursement of IR&D cost should be provided for under the terms of the contract only to the extent that such independently sponsored R&D benefits the contract work.

b. 81 percent of the contractors and 53 percent of the Government personnel disagreed with the statement that allowances to contractors for IR&D should be confined to projects that have a direct and apparent relationship to a specific function of the Government agency.

c. 57 percent of the contractors and 88 percent of the Government personnel agreed that criteria for relevancy should be developed for IR&D and B&P so that industry can take appropriate and consistent action to satisfy the criteria of a test for potential military relationship.

The opinions of both the Government and contractor personnel tend to be the same, even though in different degrees, for the subject of relevancy. There is still considerable controversy in the area of relevancy, and a concerted effort is needed to bring a resolution to the issue.

D. COMMISSION ON GOVERNMENT PROCUREMENT

The Congress established the Commission on Government Procurement after conducting extensive hearings which disclosed that the economically and politically important Government procurement process was overly complex and ineffective in its practices. The Commission was created to study and recommend to the Congress methods to promote the economy, efficiency, and effectiveness of procurement by the executive branch of the

Federal Government. The Commission consisted of twelve members, who represented the legislative and executive branches of Government as well as the public. Thirteen study groups were organized to provide the Commission with recommendations, backed up with a comprehensive set of relevant and timely data. The study groups' efforts were used as working tools by the Commission which, in turn, produced its report for the Congress. The report of the Commssion on Government Procurement is a result of this extensive study and contains 149 recommendations for improving Government procurement [Procurement Commission Report, Vol. 1, 1972].

The Procurement Commission recommendation which concerns IR&D and B&P costs is complex and will not tend to bring great satisfaction to either the Government or industry. The recommendation is as follows [Procurement Commission Report, Vol. 2, 1972, pp. 31-32]:

Recognize in cost allowability principles that IR&D and B&P expenditures are in the nation's best interests to promote competition (both domestically and internationally), to advance technology, and to foster economic growth. Establish a policy recognizing IR&D and B&P efforts as necessary costs of doing business and provide that:

(a) IR&D and B&P should receive uniform treatment, Government-wide with exceptions treated by the Office of Federal Procurement Policy.

(b) Contractor cost centers with 50 percent or more fixed-price Government contracts and sales of commercial products and services should have IR&D and B&P accepted as an overhead item without question as to amount. Reasonableness of costs for other contractors should be determined by the present DOD formula with individual ceilings for IR&D and B&P negotiated and trade-offs between the two accounts permitted.

(c) Contractor cost centers with more than 50 percent cost-type contracts should be subject to a relevancy requirement of a potential relationship to the agency function or operation in the opinion of the head of the agency. No relevancy restriction should be applied to the other contractors.

Industry would find satisfaction that IR&D and B&P costs are recognized, in the recommendation, as being necessary costs of doing business. The expectation would be that industry is pleased by the proposal that Government accept, without question, the amount of those costs by companies

whose business consisted of at least half commercial work and Government fixed-price contracts. The IR&D and B&P questionnaire results indicate that 90 percent of the contractors agree with this part of the recommendation. However, 100 percent of the government respondents disagree with the proposal, even though it is presumably designed to hold down these overhead costs by encouraging more fixed-price contracts as well as causing them to be absorbed to a greater degree by the contractor's commercial business.

Concerning the proposal that the reasonableness of costs for other contractors be determined by the present DOD formula, with individual ceilings for IR&D and B&P negotiated and with trade-offs between the two accounts permitted, the questionnaire results show that 57 percent of the contractors and 67 percent of the Government personnel agreed.

With regard to the recommendation that businesses having mainly cost-type contracts be subject to a relevancy requirement, only 20 percent of contractor respondents agreed, while 67 percent of the Government respondents agreed. The recommendation that no relevancy restrictions should be applied to other contractors was agreed to by 93 percent of the contractors, but no Government personnel were satisfied with this proposal.

As indicated by the questionnaire results, great disagreement exists regarding these costs and the Procurement Commission's proposals to regulate them. The fact that the Commission's proposals are a compromise is indicated from an interview with one of the Commission's members, Commissioner Richard E. Horner, president of the E.F. Johnson Company, who offered this compromise position and who had pushed for removal of all Government controls on IR&D. He said [National Journal, 23 June 1973, p. 898]:

We were stuck. Elmer Staats (the Comptroller General) looked on IR&D as a raid on the Treasury. He wouldn't budge. Finally, I got a majority to go along with the relevancy restrictions on cost-plus contracts by coupling it with the exemption for companies with heavy fixed-price business.

The majority recommendation won by just one vote. Five commissioners -- Senator Chiles, Congressman Holifield, Congressman Horton, Comptroller General Staats, and attorney James E. Webb -- felt that the majority recommendation could encourage contractors to realign their organizations in order to qualify for the exemption; this would lead to increased IR&D costs. They further felt that the 50 percent rule for cost-type contracts would complicate administration and be detrimental to small business because it would require them to meet a relevancy test to which they are not now subject [Procurement Commission Report, Vol. 2, 1972, p. 40].

The five dissenting commissioners voted for a different recommendation, which was intended to retain the current Department of Defense procedure for IR&D and B&P costs. They called for an agency-by-agency relevancy requirement that would be determined by advance agreement with contractors who received at least $2 million in IR&D and B&P payments in the previous fiscal year. In all other cases, they felt that the present DOD procedure of an historical formula for reasonableness should be continued. They added an additional provision to allow the Government sufficient access to a contractor's records for its commercial business so that the allowability of IR&D and B&P costs could be determined [Procurement Commission Report, Vol. 2, 1972, p. 39].

The IR&D and B&P questionnaire addressed the five dissenting commissioners' proposals. The results are as follows:

a. Statement: It is important for agreement to be reached between the Governmnet agency and its contractors in advance of the incurrence of costs in categories where reasonableness or allocability are

difficult to determine (such as IR&D) in order that possible subsequent disallowances or disputes may be avoided. Response: 77 percent of the contractors agreed; 100 percent of the Government personnel agreed.

b. Statement: The definition of reasonableness must vary with individual cases. Below $2 million dollars spent annually for IR&D by a contractor, reasonableness should be determined by application of an historical formula or by the CWAS technique. Above this threshold the Government should negotiate with the contractor in determining reasonableness. Response: 56 percent of both contractor and Government personnel agreed.

c. Statement: Allowable IR&D and B&P costs for companies not required to negotiate advance agreements should be established by an historical based formula, either on a companywide basis or by profit centers. Response: 43 percent of the contractors agreed and 55 percent of the Government personnel agreed.

d. Statement: A provision should be established whereby the Government would have sufficient access to the contractor's records for its commercial business to enable a determination that IR&D and B&P costs are allowable. Response: 30 percent of the contractors agreed, while 78 percent of the Government personnel agreed.

The above results indicate that advance agreements are satisfactory when the reasonableness of IR&D and B&P costs is nebulous. However, the historical formula approach was not found to be extremely popular. The dissenting commissioners included the proposal for access to the contractor's records for commercial business so as to insure that IR&D funds allowed under Government contracts would not be used in direct support of a contractor's commercial contracts or grants. The questionnaire indicates

that Government personnel agree with the need while, as would be expected, contractors generally have no desire for further inspection of their records.

A second dissenting position was offered to the Commission's majority position by Commissioner Frank Sanders, Undersecretary of the Navy, because he felt that the majority and the first dissenting positions were more short-term in scope and might not offer potential long-range solutions to the problems inherent in the IR&D and B&P process. Commissioner Arthur F. Sampson, acting administrator of the General Services Administration, voted for the majority position but recommended exploration of Mr. Sanders' alternatives. Commissioner Sanders proposed that several different approaches be undertaken to explore the best ways to reach a full solution for these costs. These potential solutions include the following [Procurement Commission Report, Vol. 2, 1972, pp. 40-42]:

a. Periodic agency announcements of areas in which contractor research efforts are particularly desired and the percentage of costs that the Government would pay,

b. Use of combinations of grants, guaranteed loans and interest- or non-interest bearing loans for research,

c. A system of national R&D awards funneled through various professional societies as grants to specific individuals in recognition of efforts to advance technology,

d. An approach whereby the Government would make direct research grants which contractors would account for separately and use for their own research programs subject to periodic disclosure (Commissioner Sanders described this as a "non-profit cost center" approach),

e. A tax credit device for offsetting one year's allowed expenditure against the current or subsequent year's tax, and

f. A return on investment approach for negotiation of overall profit.

The IR&D and B&P questionnaire examined the opinions of persons in industry and Government on three of Commissioner Sanders' alternatives. The response indicated that 83 percent of the contractors and 61 percent of Government personnel did not agree with the non-profit cost center approach. With regard to using a tax credit device, 76 percent of the business representatives and 56 percent of the representatives from Government did not agree with that alternative. For the return on investment approach, 87 percent of industry were against the proposal and 56 percent of the Government respondents likewise were not in favor. Hence, industry appears not to want any method of allowance other than considering these costs as an overhead item; Government personnel, as well, appear not to be receptive to use of new methods. The resistance to change may be partly explained as a natural psychological characteristic.

Neither advocates for industry nor advocates for a tougher Government position against contractors appear to have received from the Procurement Commission the objectives that they desired. Industry wanted less Government control of IR&D and B&P costs but got more in the form of a relevancy test for all agencies. Hard-line Government advocates wanted tighter controls but got a proposed exemption for contractors that have more commercial and Government fixed-price work than cost-plus type contracts. Senator Proxmire's evaluation of the Commission's IR&D and B&P recommendation is as follows [National Journal, 23 June 1973, p. 900]:

> The IR&D proposal is irresponsible, extravagant and wasteful. Whatever contractor would get away with without a scandal, they'd be inclined to try to do. Just send the bill to the Government which couldn't even question the amount.

V. CONCLUSIONS AND RECOMMENDATIONS

How should the Government of the United States plan for the future so as to provide for the best possible general welfare of its people and of this "only one earth"? Consider the following statement by Adam Smith [The Wealth of Nations, 1776]:

> Every individual endeavors to employ his capital so that its produce may be of greatest value. He generally neither intends to promote the public interest, nor knows how much he is promoting it. He intends only his own security, only his own gain. And he is in this led by an invisible hand to promote an end which was no part of his intention. By pursuing his own interest he frequently promotes that of society more effectually than when he really intends to promote it.

Sometimes the private efforts that Adam Smith talked about will not or cannot go far enough. Opportunities to raise productivity that are highly profitable from a social point of view will not be seized when they offer too little from a private point of view. The benefits from research in basic science or in technology may not be fully enjoyed by the individuals or companies making the effort and bearing the costs. There may, then, be less investment in research and development than what social concerns might suggest there "ought" to be. Or social arrangements that may have had merit in the past may now be dulling private incentives to raise productivity.

Sometimes private efforts may go too far. Advantageous though they might be to the individual or firm, they could be adding little or nothing to, or even tedning to reduce, the nation's productivity. On the other hand, an industry may cut its own costs and raise its own productivity but do so by using technologies that pollute rivers and tend to reduce the productivity of communities downstream.

When the pursuit of private interests falls short or goes too far, in terms of a social (rather than private) judgment of the results, the Government's responsibility is clear and it must take action. It can support, or support more strongly, private activities that yield greater social than private rates of return. It can reduce or eliminate its support of private activities that yield smaller social than private rates of return or even restrain such activities when this appears necessary.

When stated in these general terms, many would agree on the desirability and the general nature of governmental policies. But it is easier to agree on general principles than on specific applications. If it is to be useful, a program must specify just what should be done, how to do it, what cost is likely to be incurred, and what returns may be expected.

Conclusions and recommendations for the allowability and allocability of IR&D and B&P costs are presented and discussed in the remainder of this chapter.

1. A broad technology base for the United States can greatly contribute to the national security, the improvement of health, the spread of leisure, and the general enrichment of life for the citizens. The inherent abilities of a profit-oriented economy to initiate, diffuse, and adjust to technical change are a great asset to this well-being.

The first chapter of this thesis stressed the need to plan, in the short- and long-term, for research and development in order to allocate resources efficiently for a given technology and to advance technology. Many of the nation's urgent problems -- such as an unfavorable international balance of trade, population growth with its corollary problems of energy, pollution, housing and transportation, and the need for adequate national security -- can find timely solutions if adequate

encouragement is provided by the nation's leaders for a broad and solid industrial technology base.

The area of IR&D and B&P costs is characterized by differences of opinion. In part, disagreement arises because opinions differ on what would be most effective. It is possible that interested parties simply lack the full perspective that would point clearly to the best among several possible policies. The differences of opinion on IR&D and B&P costs also arise because of different public and private objectives. These various objectives are perceived and valued differently by different citizens. These differences are important because virtually everything the Government does, or could do, tends to further some objectives more than others. Therefore, the differences of opinion on this subject will, to a large extent, be resolved in the political arena. In this arena, fundamental realities need to be recognized.

The nation's decision-makers need to plan effectively for the future, choosing the best solutions from all of the alternatives that are available. The Government needs to manage by objectives. It needs to determine clearly the objectives of IR&D and B&P efforts and then needs to discover effective methods of measuring attempts to attain the objectives.

The Government has an objective of stimulating innovation. However, there is an additional objective of spending the general public's funds in an efficient and effective manner. The Government's leaders are concerned, because of past wasteful experiences, that unconstrained research and development effort may not meet both objectives. Industry is concerned that too much governmental control causes IR&D to lose its independence and, therefore, the ability to attain maximum innovation.

Both objectives need to be met, but one should not be met to the detriment of the other.

The Congress, with its inherent power to authorize programs and appropriate the public's funds, needs to provide more definitive IR&D and B&P policy guidance, wherein focus is given to national objectives, such as the objectives of stimulating innovation as well as to the objective of conscientious thrift. A concerted effort should be made by the Congress to communicate a harmonious balance of these objectives. The highest level of the executive branch -- the Office of Management and Budget (OMB), for example -- then needs to amplify and communicate the intent of the Congress so that each agency may determine its own objectives. These agency objectives, periodically updated to reflect changing needs and conditions, should be integrated by OMB so that the national objectives, as a whole, are known and available for use by Government and contractor personnel involved with IR&D and B&P efforts.

RECOMMENDATION: The Congress should determine what national objectives are in regard to IR&D and B&P projects. These objectives should then be communicated to the executive branch, which in turn should communicate by executive order or OMB circular policy and guidance to appropriate agencies of Government.

2. Industry takes the position that IR&D is a necessary part of keeping itself in business and that there is a need for a truly independent R&D effort. To be truly independent, industry believes that there should be no relevancy requirement associated with IR&D. On the other hand, the Government position reflected in present regulations permit, direct, or leave open to an agency's discretion the application of the rule of relevancy. The relevancy rule most applied to determine

allowability of an IR&D project, as indicated in chapter IV of this thesis, is one which requires relevance to a function or mission or to a contract requirement.

It seems logical that there should be a uniform, Government-wide policy with respect to the relevance of IR&D costs. The present policy appears to be causing too much of an adversary relationship between the two participants and undue disunity of effort. The adversary relationship is regretable. Government and industry both have the same objectives -- to encourage innovation, broaden the technological base, and increase productivity growth. However, in efforts to achieve these goals, personnel on each side of the relevancy issue become overly aggressive as partisans of their cause and thus lose sight of the common goals.

The relevancy test should consider the objectives of the Government as a whole and not the potentially parochial goals of the individual agencies or of industry. However, success in eliminating the adversary relationship will be possible only if the objectives are known and applied by all cognizant personnel.

<u>RECOMMENDATION</u>: Congress should initiate a uniform relevancy policy that requires IR&D projects to be relevant to specified national objectives.

3. IR&D and B&P costs have traditionally been allowed by DOD as a necessary business expense and have been treated as an indirect cost item, an element of a company's overhead. To replace these efforts with direct contract support would reduce the independent, original and creative thinking of contractors and would narrow the support base available to the Government. Direct contracting would also cause the Government to incur a significant administrative burden. To treat IR&D as a profit factor does not appear viable because it could not be practically

administered and applied. The amount of profit would continually be subject to controversy.

RECOMMENDATION: Government contracting policies should continue to recognize IR&D and B&P costs as overhead charges of industry and a normal cost of being in business.

4. The dual determination of reasonableness used by the Department of Defense is practical, satisfies Government's concern for adequate control and, at the same time, preserves the necessary independent nature of IR&D work. Use of negotiated advance agreements with the relatively few large defense contractors limits the amount of administrative resources required for technical and cost evaluation and control. The Defense Department's historically based formula used for the large number of smaller companies who recover IR&D and B&P costs is workable and can be uniformly applied. This method, as described in chapter IV, offers results that can be easily monitored with less administrative effort than is necessary for advance agreements. The formula method can also be easily adjusted, if necessary. Using actual sales or costs as a basis for the formula is practical and reasonable.

There is a need for advance agreements to be negotiated prior to the incurrence of cost. It appears reasonable that multi-year advance agreements could be accomplished with firms that are known to use sound business practices in order to aid in effecting timeliness of the agreements. Knowledge of companies with sound business practices should be available from analyses of successfully completed Government contracts.

RECOMMENDATION: The Government should continue to determine the reasonableness of IR&D and B&P costs by means of advance agreements with large contractors and by use of an historically based formula for smaller

contractors. Use of multi-year advance agreements with companies who have demonstrated sound business practices should be explored.

5. Cost ceilings determine the total amount of costs that the Government will recognize. These limitations are necessary because the Government must maintain some degree of control over the public's funds that are used for non-competitive procurement. It is recognized that the contractor may spend additional IR&D and B&P funds out of his profits when his company objectives dictate such action. The policy of not sharing the costs within the ceiling is fair because they should be considered as overhead costs of a firm. Allowing transfer of costs from IR&D to B&P and vice versa is practical because of the difficulty of distinguishing between the two categories.

RECOMMENDATION: Government procurement contracts should continue use of separate dollar ceilings for IR&D and B&P costs without any requirement to share costs within the ceilings and allow transfer of funds between the two without exceeding the combined total ceiling.

6. In consideration of all the evidence that has been presented on the subject of allocability of IR&D and B&P costs in chapter III, a cost accounting standard (or possibly more than one) for these costs is needed. The number of alternate methods of reporting these costs is too great and must be reduced. It is important that IR&D and B&P costs have more comparability, reliability, and consistency. However, before effective standards for these costs can come about, it appears that preceding standards are required. For example, standards covering (i) segment general and administrative expenses, (ii) allocation of burden, and (iii) direct and indirect charging may all provide guidance that will clarify, to a large extent, controversial areas of IR&D and B&P costs and will act as a foundation on which to build meaningful and effective standards.

What should a cost accounting standard for IR&D and B&P costs contain? First, the definitions of research and development should be clarified so that accounting for them will be accurate. If possible, the accounting definitions should be the same as technical definitions. If not possible, differences between the definitions should be clearly understood.

Second, determination of the composition of IR&D and B&P cost pools should be consistent and uniform. The alternative accounting methods for accomplishing overhead absorption for these costs need to be reduced. The method of including direct and allocable indirect costs but not G&A expenses appears to be satisfactory and should be considered a practical solution to the problem of composition.

Third, alternate methods of allocating IR&D and B&P costs to final cost objectives need to be more limited. It is often difficult to relate these costs to a specific end object. Nevertheless, a standard should address desirable alternate methods of allocation and provide a hierarchical ranking of them.

Fourth, their needs to be a hierarchy of bases for allocation that addresses the best ways to distribute IR&D and B&P costs according to responsibility assumed and benefits received by the several beneficiaries. Because it is difficult to determine who receives the benefits, the allocation base can very easily be selected arbitrarily. Hence, using the same basis that is used for allocating G&A expense seems reasonable and should rank high in any cost accounting standard's hierarchy of bases.

Fifth, IR&D and B&P cost accounting standards should provide direction as to when these costs can be capitalized and then amortized

over future periods. Generally, IR&D and B&P costs should not be capitalized, because it is very difficult to establish the amortization period for which the possible benefits may accrue and the uncertainty of research work does not provide a firm basis for capitalization. IR&D and B&P costs should be deferred only if they meet specific criteria, similar to those mentioned in the AICPA study [Ref. 19].

RECOMMENDATION: The Cost Accounting Standards Board should develop cost accounting standards for IR&D and B&P costs that will identify and limit alternatives and resolve the issues of

a. the proper classification and accumulation of IR&D and B&P costs,

b. allowable methods of allocation to the various cost objectives in a hierarchical ranking,

c. the bases to be used for distribution, and

d. deferral of costs to a future period or immediate recognition.

The requirement that IR&D and B&P cost pools be composed of direct and all allocable indirect costs, but not general and administrative expenses, should be continued pending development of a cost accounting standard in this area. Also, the general requirement to allocate IR&D and B&P costs on the same basis as general and administrative expenses should be used until a cost accounting standard in this area can be promulgated.

APPENDIX A. IR&D AND B&P QUESTIONNAIRE

The IR&D and B&P questionnaire was organized so that addressees could indicate their opinions on fifty separate statements related to IR&D and B&P costs. To help ensure a reasonable degree of comparability in the responses to the questionnaire, definitions of significant terms were provided. It was realized that many of the opinions could be expressed with a simple yes or no answer. A wider range of answers was provided for those who wanted to indicate a degree of uncertainty. Those choices were the following:

1. No / Strongly disagree.
2. Disagree. You disagree more than you agree.
3. No opinion.
4. Agree. You agree more than you disagree.
5. Yes / Strongly agree.

In addition, on three of the statements recipients were asked to select their preference among different alternatives or to specify other alternatives.

On the following pages, the statements of the questionnaire are presented. Following each statement is a statistical matrix presentation of the response results. The various responses that could have been chosen are indicated across the top of the matrix at the head of each column. The left-hand side of the matrix, the row headings, indicates the two categories of respondents. Contractors are represented by the symbol KR 50 and Government personnel, by the symbol NOT KR 60. Each cell of the matrix presents the following data, reading from top to bottom: (i) the number of respondents in the particular category (i.e., contractors or

Government personnel) who chose that answer (COUNT), (ii) the percentage of respondents in the particular category who selected that answer (ROW PCT), (iii) the percentage of respondents in the category who chose an answer out of the total of all respondents in both categories who picked that answer (COL PCT), and (iv) the percentage of those in a category who selected an answer out of the total number of respondents in both categories (TOT PCT).

Various statistical coefficients are provided for each statement's response. Details concerning interpretation of these data can be obtained by referring to reference 51 (Statistical Package for the Social Sciences).

IR&D AND B&P QUESTIONNAIRE DEFINITIONS

1. INDEPENDENT RESEARCH AND DEVELOPMENT (IR&D): A contractor's independent research and development (IR&D) is that technical effort which is not sponsored by, or required in performance of, a contract or grant and which consists of projects falling in three areas: (1) basic and applied research, (2) development, and (3) systems and other concept formulation studies.

2. BID AND PROPOSAL COSTS (B&P): Bid and Proposal (B&P) costs are the costs incurred in preparing, submitting, and supporting bids and proposals (whether or not solicited) on potential Government or non-Government contracts.

3. UNIFORMITY: Uniformity relates to comparison of two or more accounting entities. It is achieved when contractors with the same circumstances (with respect to a given subject) follow the practice appropriate for those circumstances.

4. COST OBJECTIVE: Cost Objective is a function, organizational subdivision, contract or other work unit for which cost data are desired and for which provision is made to accumulate and measure the costs of processes, products, jobs, capitalized projects, etc.

5. ALLOCABILITY: Allocability is an accounting concept affecting the ascertainment of contract cost; it results from a relationship between a cost and a cost objective such that the cost objective appropriately bears all or a portion of the cost. To be charged with all or part of a cost, a cost objective should cause or be an intended beneficiary of the cost.

6. ALLOWABILITY: Allowability is a procurement concept affecting contract price and in most cases is expressly provided in regulatory or contractual provisions. A contracting agency may include in contract terms or in its procurement regulations a provision that it will refuse to allow certain costs, incurred by contractors, that are unreasonable in amount or contrary to public policy.

7. DIRECT COST: Direct cost is any cost which is identified specifically with a particular final cost objective. Direct costs are not limited to items which are incorporated in the end product as material or labor. Costs identified specifically with a contract are direct costs of that contract. All costs identified specifically with other final cost objectives of the contractor are direct costs of those cost objectives.

8. INDIRECT COST: Indirect cost is any cost not directly identified with a single final cost objective, but identified with two or more final cost objectives or with at least one intermediate cost objective.

1. Cost allowability principles should recognize that IR&D and B&P expenditures are in the nation's best interest to promote competition (both domestically and internationally), to advance technology, and to foster economic growth.

VAR001

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KP	50.	0	0	0	30	30
		0.0	0.0	0.0	100.0	62.5
		0.0	0.0	0.0	83.3	
		0.0	0.0	0.0	62.5	
NOT KP	60.	1	3	8	6	18
		5.6	16.7	44.4	33.3	37.5
		100.0	100.0	100.0	16.7	
		2.1	6.3	16.7	12.5	
	COLUMN TOTAL	1	3	8	36	48
		2.1	6.3	16.7	75.0	100.0

CHI SQUARE = 26.66664 WITH 3 DEGREES OF FREEDOM
CRAMER'S V = 0.74536
CONTINGENCY COEFFICIENT = 0.59761
KENDALL'S TAU B = -0.71688
KENDALL'S TAU C = -0.62500
GAMMA = -1.00000
SOMER'S D = -0.77086

2. A contractor's performance of IR&D generally results in reduced costs to the Government because of exploratory work completed before the Government becomes committed to the execution of a formal contract.

VAR002

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KP	50.	1	0	1	9	19	30
		3.3	0.0	3.3	30.0	63.3	62.5
		25.0	0.0	33.3	64.3	90.5	
		2.1	0.0	2.1	18.8	39.6	
NOT KP	60.	3	6	2	5	2	18
		16.7	33.3	11.1	27.8	11.1	37.5
		75.0	100.0	66.7	35.7	9.5	
		6.3	12.5	4.2	10.4	4.2	
	COLUMN TOTAL	4	6	3	14	21	48
		8.3	12.5	6.3	29.2	43.8	100.0

CHI SQUARE = 20.52061 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.65384
CONTINGENCY COEFFICIENT = 0.54725
KENDALL'S TAU B = -0.56492
KENDALL'S TAU C = -0.64583
GAMMA = -0.82301
SOMER'S D = -0.46326

3. DOD policy on IR&D and B&P costs encourage companies to conduct independent research and development.

VAR003

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KP	50.	5	6	0	13	6	30
		16.7	20.0	0.0	43.3	20.0	62.5
		100.0	66.7	0.0	65.0	46.2	
		10.4	12.5	0.0	27.1	12.5	
NOT KP	60.	0	3	1	7	7	18
		0.0	16.7	5.6	38.9	38.9	37.5
		0.0	33.3	100.0	35.0	53.8	
		0.0	6.3	2.1	14.6	14.6	
	COLUMN TOTAL	5	9	1	20	13	48
		10.4	18.8	2.1	41.7	27.1	100.0

CHI SQUARE = 6.26871 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.36139
CONTINGENCY COEFFICIENT = 0.33987
KENDALL'S TAU B = 0.23077
KENDALL'S TAU C = 0.26563
GAMMA = 0.39222
SOMERS'S D = 0.18796

4. Defense firms are spending excessive amounts for IR&D in relation to their sales.

VAR004

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KP	50.	19	4	5	1	1	30
		63.3	13.3	16.7	3.3	3.3	62.5
		82.6	44.4	45.5	25.0	100.0	
		39.6	8.3	10.4	2.1	2.1	
NOT KP	60.	4	5	6	3	0	18
		22.2	27.8	33.3	16.7	0.0	37.5
		17.4	55.6	54.5	75.0	0.0	
		8.3	10.4	12.5	6.3	0.0	
	COLUMN TOTAL	23	9	11	4	1	48
		47.9	18.8	22.9	8.3	2.1	100.0

CHI SQUARE = 9.58360 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.44682
CONTINGENCY COEFFICIENT = 0.40796
KENDALL'S TAU B = 0.34405
KENDALL'S TAU C = 0.38715
GAMMA = 0.54258
SOMERS'S D = 0.29643

5. It would be highly desirable for all government agencies to adopt uniform policies and procedures regarding IR&D and B&P costs so as to assure equitable treatment of all government contractors.

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	VAR005: STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	1	1	0	3	24	1	30
		3.3	3.3	0.0	10.0	80.0	3.3	62.5
		100.0	50.0	0.0	37.5	70.6	100.0	
		2.1	2.1	0.0	6.3	50.0	2.1	
NOT KR	60.	0	1	2	5	10	0	18
		0.0	5.6	11.1	27.8	55.6	0.0	37.5
		0.0	50.0	100.0	62.5	29.4	0.0	
		0.0	2.1	4.2	10.4	20.8	0.0	
	COLUMN TOTAL	1	2	2	8	34	1	48
		2.1	4.2	4.2	16.7	70.8	2.1	100.0

CHI SQUARE = 7.74992 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.40182
CONTINGENCY COEFFICIENT = 0.37284
KENDALL'S TAU B = -0.28538
KENDALL'S TAU C = -0.26736
GAMMA = -0.54225
SOMERS'S D = -0.28678

6. There is a need for explicit guidance on composition of IR&D and B&P costs and the allocation of these costs to specific cost objectives.

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	VAR006: STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	11	8	1	9	1	30
		36.7	26.7	3.3	30.0	3.3	62.5
		91.7	72.7	50.0	52.9	16.7	
		22.9	16.7	2.1	18.8	2.1	
NOT KR	60.	1	3	1	8	5	18
		5.6	16.7	5.6	44.4	27.8	37.5
		8.3	27.3	50.0	47.1	83.3	
		2.1	6.3	2.1	16.7	10.4	
	COLUMN TOTAL	12	11	2	17	6	48
		25.0	22.9	4.2	35.4	12.5	100.0

CHI SQUARE = 11.02032 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.47916
CONTINGENCY CO-EFFICIENT = 0.43211
KENDALL'S TAU B = 0.42238
KENDALL'S TAU C = 0.41826
GAMMA = 0.67212
SOMERS'S D = 0.33567

7. It is practicable to make a preponderant identification of IR&D to the segment or segments of the organization which are likely to benefit.

VAR007

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	7	11	1	7	4	30
		23.3	36.7	3.3	23.3	13.3	62.5
		100.0	73.3	33.3	43.8	57.1	
		14.6	22.9	2.1	14.6	8.3	
NOT KR	60.	0	4	2	9	3	18
		0.0	22.2	11.1	50.0	16.7	37.5
		0.0	26.7	66.7	56.3	42.9	
		0.0	8.3	4.2	18.8	6.3	
	COLUMN TOTAL	7	15	3	16	7	48
		14.6	31.3	6.3	33.3	14.6	100.0

CHI SQUARE = 8.52571 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.42145
CONTINGENCY COEFFICIENT = 0.38837
KENDALL'S TAU B = 0.30411
KENDALL'S TAU C = 0.35938
GAMMA = 0.49403
SOMER'S D = 0.24126

8. Reimbursement of IR&D cost should be provided for under the terms of the contract to the extent that such independently sponsored R&D benefits the contract work.

VAR008

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	24	3	1	1	1	30
		80.0	10.0	3.3	3.3	3.3	62.5
		72.7	42.9	100.0	16.7	100.0	
		50.0	6.3	2.1	2.1	2.1	
NOT KR	60.	9	4	0	5	0	18
		50.0	22.2	0.0	27.8	0.0	37.5
		27.3	57.1	0.0	83.3	0.0	
		18.8	8.3	0.0	10.4	0.0	
	COLUMN TOTAL	33	7	1	6	1	48
		68.8	14.6	2.1	12.5	2.1	100.0

CHI SQUARE = 9.20288 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.43787
CONTINGENCY COEFFICIENT = 0.40110
KENDALL'S TAU B = 0.29898
KENDALL'S TAU C = 0.28646
GAMMA = 0.53746
SOMER'S D = 0.29255

9. Allowances to contractors for IR&D should be confined to projects that have a direct and apparent relationship to a specific function of the Government agency.

VAR009

AFFIL (COUNT / ROW PCT / COL PCT / TOT PCT)		STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	26	2	0	0	1	1	30
		86.7	6.7	0.0	0.0	3.3	3.3	62.5
		83.9	28.6	0.0	0.0	50.0	100.0	
		54.2	4.2	0.0	0.0	2.1	2.1	
NOT KR	60.	5	5	1	6	1	0	18
		27.8	27.8	5.6	33.3	5.6	0.0	37.5
		16.1	71.4	100.0	100.0	50.0	0.0	
		10.4	10.4	2.1	12.5	2.1	0.0	
COLUMN TOTAL		31	7	1	6	2	1	48
		64.6	14.6	2.1	12.5	4.2	2.1	100.0

CHI SQUARE = 21.87894 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.67514
CONTINGENCY COEFFICIENT = 0.55955
KENDALL'S TAU B = 0.52146
KENDALL'S TAU C = 0.53646
GAMMA = 0.77444
SOMER'S D = 0.49361

10. B&P costs should not be included within the purview of control procedures used for IR&D expenses.

VAR010

AFFIL (COUNT / ROW PCT / COL PCT / TOT PCT)		STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	0	4	1	10	15	30
		0.0	13.3	3.3	33.3	50.0	62.5
		0.0	50.0	50.0	58.8	88.2	
		0.0	8.3	2.1	20.8	31.3	
NOT KR	60.	4	4	1	7	2	18
		22.2	22.2	5.6	38.9	11.1	37.5
		100.0	50.0	50.0	41.2	11.8	
		8.3	8.3	2.1	14.6	4.2	
COLUMN TOTAL		4	8	2	17	17	48
		8.3	16.7	4.2	35.4	35.4	100.0

CHI SQUARE = 12.23529 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.50488
CONTINGENCY COEFFICIENT = 0.45069
KENDALL'S TAU B = -0.42803
KENDALL'S TAU C = -0.49479
GAMMA = -0.67376
SOMER'S D = -0.34714

11. Both IR&D and B&P cost pools should have ceilings.

VAR011

AFFIL	COUNT ROW PCT COL PCT TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	15 50.0 93.8 31.3	4 13.3 80.0 8.3	1 3.3 100.0 2.1	7 23.3 53.8 14.6	1 3.3 9.1 2.1	2 6.7 100.0 4.2	30 62.5
NOT KR	60.	1 5.6 6.3 2.1	1 5.6 20.0 2.1	0 0.0 0.0 0.0	6 33.3 46.2 12.5	10 55.6 90.9 20.8	0 0.0 0.0 0.0	18 37.5
	COLUMN TOTAL	16 33.3	5 10.4	1 2.1	13 27.1	11 22.9	2 4.2	48 100.0

CHI SQUARE = 22.92325 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.69106
CONTINGENCY COEFFICIENT = 0.56852
KENDALL'S TAU B = 0.49923
KENDALL'S TAU C = 0.59201
GAMMA = 0.72708
SOMER'S D = 0.39468

12. Within a ceiling limitation determined by an advance agreement with the Government, contractors should not be required to share IR&D costs.

VAR012

AFFIL	COUNT ROW PCT COL PCT TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	0 0.0 0.0 0.0	1 3.3 20.0 2.1	0 0.0 0.0 0.0	3 10.0 42.9 6.3	26 86.7 92.9 54.2	0 0.0 0.0 0.0	30 62.5
NOT KR	60.	5 27.8 100.0 10.4	4 22.2 80.0 8.3	2 11.1 100.0 4.2	4 22.2 57.1 8.3	2 11.1 7.1 4.2	1 5.6 100.0 2.1	18 37.5
	COLUMN TOTAL	5 10.4	5 10.4	2 4.2	7 14.6	28 58.3	1 2.1	48 100.0

CHI SQUARE = 29.34853 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.78194
CONTINGENCY COEFFICIENT = 0.61598
KENDALL'S TAU B = -0.62104
KENDALL'S TAU C = -0.66667
GAMMA = -0.81356
SOMER'S D = -0.54237

13. Provision should be made permitting the contractor to increase recovery of costs for either IR&D or B&P above the individually negotiated ceilings, provided that recovery of costs for the other is decreased below its ceiling by a like amount.

VAR013

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	0	1	0	3	26	30
		0.0	3.3	0.0	10.0	86.7	62.5
		0.0	12.5	0.0	37.5	96.3	
		0.0	2.1	0.0	6.3	54.2	
NOT KR	60.	3	7	2	5	1	18
		16.7	38.9	11.1	27.8	5.6	37.5
		100.0	87.5	100.0	62.5	3.7	
		6.3	14.6	4.2	10.4	2.1	
	COLUMN TOTAL	3	8	2	8	27	48
		6.3	16.7	4.2	16.7	56.3	100.0

CHI SQUARE = 32.15799 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.81851
CONTINGENCY COEFFICIENT = 0.63339
KENDALL'S TAU B = -0.75634
KENDALL'S TAU C = -0.81597
GAMMA = -0.95528
SOMER'S D = -0.65551

14. Government agencies should establish guidelines that uniformly recognize, during IR&D and B&P ceiling negotiations, the technical quality of contractors' IR&D programs with reward or penalty, as appropriate.

VAR014

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	3	4	2	9	11	1	30
		10.0	13.3	6.7	30.0	36.7	3.3	62.5
		50.0	100.0	66.7	50.0	68.8	100.0	
		6.3	8.3	4.2	18.8	22.9	2.1	
NOT KR	60.	3	0	1	9	5	0	18
		16.7	0.0	5.6	50.0	27.8	0.0	37.5
		50.0	0.0	33.3	50.0	31.3	0.0	
		6.3	0.0	2.1	18.8	10.4	0.0	
	COLUMN TOTAL	6	4	3	18	16	1	48
		12.5	8.3	6.3	37.5	33.3	2.1	100.0

CHI SQUARE = 4.38839 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.31914
CONTINGENCY COEFFICIENT = 0.30403
KENDALL'S TAU B = -0.03523
KENDALL'S TAU C = -0.03424
GAMMA = -0.09415
SOMER'S D = -0.04452

15. Presently there are sufficient guidelines for excluding IR&D overruns from indirect costs.

VAR015

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	2	0	2	8	16	2	30
		6.7	0.0	6.7	26.7	53.3	6.7	62.5
		40.0	0.0	33.3	72.7	94.1	100.0	
		4.2	0.0	4.2	16.7	33.3	4.2	
NOT KR	60.	3	7	4	3	1	0	18
		16.7	38.9	22.2	16.7	5.6	0.0	37.5
		60.0	100.0	66.7	27.3	5.9	0.0	
		6.3	14.6	8.3	6.3	2.1	0.0	
	COLUMN TOTAL	5	7	6	11	17	2	48
		10.4	14.6	12.5	22.9	35.4	4.2	100.0

CHI SQUARE = 23.86630 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.70513
CONTINGENCY COEFFICIENT = 0.57628
KENDALL'S TAU B = -0.56833
KENDALL'S TAU C = -0.68403
GAMMA = -0.81070
SOMER'S D = -0.44270

16. IR&D overruns should be included in indirect costs for allocation to both commercial and Government work.

VAR016

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	3	1	1	7	16	2	30
		10.0	3.3	3.3	23.3	53.3	6.7	62.5
		23.1	25.0	50.0	70.0	94.1	100.0	
		6.3	2.1	2.1	14.6	33.3	4.2	
NOT KR	60.	10	3	1	3	1	0	18
		55.6	16.7	5.6	16.7	5.6	0.0	37.5
		76.9	75.0	50.0	30.0	5.9	0.0	
		20.8	6.3	2.1	6.3	2.1	0.0	
	COLUMN TOTAL	13	4	2	10	17	2	48
		27.1	8.3	4.2	20.8	35.4	4.2	100.0

CHI SQUARE = 19.84482 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.64299
CONTINGENCY COEFFICIENT = 0.54084
KENDALL'S TAU B = -0.57049
KENDALL'S TAU C = -0.67535
GAMMA = -0.82942
SOMER'S D = -0.45180

17. The costs of preparing both successful and unsuccessful bids and proposals should be allowable if their subject matter is applicable to the agency program.

VAR017

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	3	0	1	3	21	2	30
		10.0	0.0	3.3	10.0	70.0	6.7	62.5
		100.0	0.0	50.0	23.1	77.8	100.0	
		6.3	0.0	2.1	6.3	43.8	4.2	
NOT KR	60.	0	1	1	10	6	0	18
		0.0	5.6	5.6	55.6	33.3	0.0	37.5
		0.0	100.0	50.0	76.9	22.2	0.0	
		0.0	2.1	2.1	20.8	12.5	0.0	
COLUMN TOTAL		3	1	2	13	27	2	48
		6.3	2.1	4.2	27.1	56.3	4.2	100.0

CHI SQUARE = 16.10929 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.57932
CONTINGENCY COEFFICIENT = 0.50128
KENDALL'S TAU B = -0.33314
KENDALL'S TAU C = -0.35938
GAMMA = -0.54047
SOMER'S D = -0.29827

18. As a general rule, IR&D and B&P costs should be allocated to contracts on the same basis as the general and administrative (G&A) expense grouping of the profit center in which such costs are incurred.

VAR018

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	1	2	1	8	18	0	30
		3.3	6.7	3.3	26.7	60.0	0.0	62.5
		50.0	66.7	100.0	40.0	85.7	0.0	
		2.1	4.2	2.1	16.7	37.5	0.0	
NOT KR	60.	1	1	0	12	3	1	18
		5.6	5.6	0.0	66.7	16.7	5.6	37.5
		50.0	33.3	0.0	60.0	14.3	100.0	
		2.1	2.1	0.0	25.0	6.3	2.1	
COLUMN TOTAL		2	3	1	20	21	1	48
		4.2	6.3	2.1	41.7	43.8	2.1	100.0

CHI SQUARE = 11.57079 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.49099
CONTINGENCY COEFFICIENT = 0.44072
KENDALL'S TAU B = -0.25106
KENDALL'S TAU C = -0.27757
GAMMA = -0.40568
SOMER'S D = -0.21685

19. It is desirable for the Government to establish a hierarchy of allocation methods for the selection of an appropriate allocation base, based on achieving the most realistic representation of the beneficial or causal relationship that is practical in the circumstance.

VAR019

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	12 40.0 100.0 25.0	8 26.7 66.7 16.7	2 6.7 28.6 4.2	2 6.7 25.0 4.2	5 16.7 71.4 10.4	1 3.3 50.0 2.1	30 62.5
NOT KR	60.	0 0.0 0.0 0.0	4 22.2 33.3 8.3	5 27.8 71.4 10.4	6 33.3 75.0 12.5	2 11.1 28.6 4.2	1 5.6 50.0 2.1	18 37.5
	COLUMN TOTAL	12 25.0	12 25.0	7 14.6	8 16.7	7 14.6	2 4.2	48 100.0

CHI SQUARE = 15.83841 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.57551
CONTINGENCY COEFFICIENT = 0.49881
KENDALL'S TAU B = 0.33817
KENDALL'S TAU C = 0.41493
GAMMA = 0.50316
SOMER'S D = 0.25838

20. A Cost Accounting Standard on IR&D and B&P costs:

(1) Should deal only with criteria and policies.

VAR020

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	0	0	2	7	21	30
		0.0	0.0	6.7	23.3	70.0	62.5
		0.0	0.0	66.7	43.8	87.5	
		0.0	0.0	4.2	14.6	43.8	
NOT KR	60.	3	2	1	9	3	18
		16.7	11.1	5.6	50.0	16.7	37.5
		100.0	100.0	33.3	56.3	12.5	
		6.3	4.2	2.1	18.8	6.3	
	COLUMN TOTAL	3	2	3	16	24	48
		6.3	4.2	6.3	33.3	50.0	100.0

CHI SQUARE = 17.15555 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.59784
CONTINGENCY COEFFICIENT = 0.51313
KENDALL'S TAU B = -0.51462
KENDALL'S TAU C = -0.55903
GAMMA = -0.78155
SOMER'S D = -0.44414

21. A Cost Accounting Standard on IR&D and B&P costs:

(2) Should be more procedural in content.

VAR021

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	15	1	3	1	2	8	30
		50.0	3.3	10.0	3.3	6.7	26.7	62.5
		83.3	14.3	50.0	33.3	66.7	72.7	
		31.3	2.1	6.3	2.1	4.2	16.7	
NOT KR	60.	3	6	3	2	1	3	18
		16.7	33.3	16.7	11.1	5.6	16.7	37.5
		16.7	85.7	50.0	66.7	33.3	27.3	
		6.3	12.5	6.3	4.2	2.1	6.3	
	COLUMN TOTAL	18	7	6	3	3	11	48
		37.5	14.6	12.5	6.3	6.3	22.9	100.0

CHI SQUARE = 12.27821 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.50576
CONTINGENCY COEFFICIENT = 0.45132
KENDALL'S TAU B = 0.10457
KENDALL'S TAU C = 0.12500
GAMMA = 0.15929
SOMER'S D = 0.08200

22. A Cost Accounting Standard should require that each contractor establish and adhere to a reasonable IR&D and B&P cost policy rather than a uniform policy.

VAR022

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	0	0	2	8	20	0	30
		0.0	0.0	6.7	26.7	66.7	0.0	62.5
		0.0	0.0	66.7	50.0	90.9	0.0	
		0.0	0.0	4.2	16.7	41.7	0.0	
NOT KR	60.	2	4	1	8	2	1	18
		11.1	22.2	5.6	44.4	11.1	5.6	37.5
		100.0	100.0	33.3	50.0	9.1	100.0	
		4.2	8.3	2.1	16.7	4.2	2.1	
	COLUMN TOTAL	2	4	3	16	22	1	48
		4.2	8.3	6.3	33.3	45.8	2.1	100.0

CHI SQUARE = 20.33130 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.65082
CONTINGENCY COEFFICIENT = 0.54547
KENDALL'S TAU B = -0.46926
KENDALL'S TAU C = -0.52431
GAMMA = -0.69585
SOMER'S D = -0.39374

23. The detail and depth of cost accounting treatment required of a contractor as backup support for proposals, billings. or claims, should be the minimum necessary to establish and maintain visibility as to:

(1) The amount and nature of the costs which have been identified as IR&D and B&P.

(2) The accounting treatment which has been accorded such costs.

VAR023

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	0	0	12	18	30
		0.0	0.0	40.0	60.0	62.5
		0.0	0.0	50.0	81.8	
		0.0	0.0	25.0	37.5	
NOT KR	60.	1	1	12	4	18
		5.6	5.6	66.7	22.2	37.5
		100.0	100.0	50.0	18.2	
		2.1	2.1	25.0	8.3	
	COLUMN TOTAL	1	1	24	22	48
		2.1	2.1	50.0	45.8	100.0

CHI SQUARE = 8.43636 WITH 3 DEGREES OF FREEDOM
CRAMER'S V = 0.41923
CONTINGENCY COEFFICIENT = 0.38663
KENDALL'S TAU B = -0.39372
KENDALL'S TAU C = -0.39583
GAMMA = -0.70370
SOMER'S D = -0.36715

24. IR&D and B&P costs should be handled as independent issues when formulating Cost Accounting Standards.

VAR024

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	3 10.0 60.0 6.3	1 3.3 50.0 2.1	3 10.0 60.0 6.3	13 43.3 56.5 27.1	10 33.3 76.9 20.8	30 62.5
NOT KR	60.	2 11.1 40.0 4.2	1 5.6 50.0 2.1	2 11.1 40.0 4.2	10 55.6 43.5 20.8	3 16.7 23.1 6.3	18 37.5
	COLUMN TOTAL	5 10.4	2 4.2	5 10.4	23 47.9	13 27.1	48 100.0

CHI SQUARE = 1.66457 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.18622
CONTINGENCY COEFFICIENT = 0.18307
KENDALL'S TAU B = -0.13131
KENDALL'S TAU C = -0.14757
GAMMA = -0.23161
SOMER'S D = -0.10954

25. A Cost Accounting Standard for IR&D and B&P should address the classification, accumulation, and allocation of IR&D and B&P costs.

VAR025

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	10 33.3 100.0 20.8	1 3.3 100.0 2.1	2 6.7 66.7 4.2	14 46.7 53.8 29.2	3 10.0 50.0 6.3	0 0.0 0.0 0.0	30 62.5
NOT KR	60.	0 0.0 0.0 0.0	0 0.0 0.0 0.0	1 5.6 33.3 2.1	12 66.7 46.2 25.0	3 16.7 50.0 6.3	2 11.1 100.0 4.2	18 37.5
	COLUMN TOTAL	10 20.8	1 2.1	3 6.3	26 54.2	6 12.5	2 4.2	48 100.0

CHI SQUARE = 11.18632 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.48275
CONTINGENCY COEFFICIENT = 0.43474
KENDALL'S TAU B = 0.40367
KENDALL'S TAU C = 0.44271
GAMMA = 0.70537
SOMER'S D = 0.34506

26. IR&D costs should be expensed rather than capitalized.

VAR026

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	0 0.0 0.0 0.0	0 0.0 0.0 0.0	0 0.0 0.0 0.0	5 16.7 50.0 10.4	25 83.3 80.6 52.1	30 62.5
NOT KR	60.	1 5.6 100.0 2.1	5 27.8 100.0 10.4	1 5.6 100.0 2.1	5 27.8 50.0 10.4	6 33.3 19.4 12.5	18 37.5
	COLUMN TOTAL	1 2.1	5 10.4	1 2.1	10 20.8	31 64.6	48 100.0

CHI SQUARE = 16.68916 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.58964
CONTINGENCY COEFFICIENT = 0.50792
KENDALL'S TAU B = -0.53228
KENDALL'S TAU C = -0.52951
GAMMA = -0.93542
SOMER'S D = -0.50144

27. The contractor's benefits of having a IR&D and B&P Cost Accounting Standard will outweigh the associated costs.

VAR027

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	12 40.0 100.0 25.0	8 26.7 72.7 16.7	7 23.3 58.3 14.6	1 3.3 12.5 2.1	1 3.3 25.0 2.1	1 3.3 100.0 2.1	30 62.5
NOT KR	60.	0 0.0 0.0 0.0	3 16.7 27.3 6.3	5 27.8 41.7 10.4	7 38.9 87.5 14.6	3 16.7 75.0 6.3	0 0.0 0.0 0.0	18 37.5
	COLUMN TOTAL	12 25.0	11 22.9	12 25.0	8 16.7	4 8.3	1 2.1	48 100.0

CHI SQUARE = 19.31313 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.63432
CONTINGENCY COEFFICIENT = 0.53564
KENDALL'S TAU B = 0.49533
KENDALL'S TAU C = 0.60243
GAMMA = 0.73673
SOMER'S D = 0.38353

28. The basis for relevancy should be developed for IR&D and B&P so that industry can take appropriate and consistent action to satisfy the criteria of a test for potential military relationship.

VAR028

AFFIL	COUNT ROW PCT COL PCT TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KP	50.	4 13.3 80.0 8.3	3 10.0 75.0 6.3	2 6.7 66.7 4.2	12 40.0 52.2 25.0	6 20.0 60.0 12.5	3 10.0 100.0 6.3	30 62.5
NOT KP	60.	1 5.6 20.0 2.1	1 5.6 25.0 2.1	1 5.6 33.3 2.1	11 61.1 47.8 22.9	4 22.2 40.0 8.3	0 0.0 0.0 0.0	18 37.5
	COLUMN TOTAL	5 10.4	4 8.3	3 6.3	23 47.9	10 20.8	3 6.3	48 100.0

CHI SQUARE = 3.81526 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.28193
CONTINGENCY COEFFICIENT = 0.27135
KENDALL'S TAU B = 0.01068
KENDALL'S TAU C = 0.02257
GAMMA = 0.03467
SOMER'S D = 0.01609

29. Government IR&D administrative procedures should include pre-negotiation arrangements, brochure requirements, and the scope and nature of technical evaluations.

VAR029

AFFIL	COUNT ROW PCT COL PCT TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KP	50.	1 3.3 50.0 2.1	3 10.0 100.0 6.3	2 6.7 40.0 4.2	16 53.3 59.3 33.3	7 23.3 70.0 14.6	1 3.3 100.0 2.1	30 62.5
NOT KP	60.	1 5.6 50.0 2.1	0 0.0 0.0 0.0	3 16.7 60.0 6.3	11 61.1 40.7 22.9	3 16.7 30.0 6.3	0 0.0 0.0 0.0	18 37.5
	COLUMN TOTAL	2 4.2	3 6.3	5 10.4	27 56.3	10 20.8	1 2.1	48 100.0

CHI SQUARE = 3.97432 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.28775
CONTINGENCY COEFFICIENT = 0.27653
KENDALL'S TAU B = -0.07709
KENDALL'S TAU C = -0.08333
GAMMA = -0.14286
SOMER'S D = -0.06625

30. Where there is a lack of normal competitive restraints, IR&D must be subject to cost control (but not technical control) to preclude excessive charges to the Government.

VAR030

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	4 13.3 66.7 8.3	5 16.7 33.3 10.4	1 3.3 50.0 2.1	16 53.3 72.7 33.3	4 13.3 36.4 8.3	0 0.0 0.0 0.0	30 62.5
NOT KR	60.	2 11.1 33.3 4.2	1 5.6 16.7 2.1	1 5.6 50.0 2.1	6 33.3 27.3 12.5	7 38.9 63.6 14.6	1 5.6 100.0 2.1	18 37.5
	COLUMN TOTAL	6 12.5	6 12.5	2 4.2	22 45.8	11 22.9	1 2.1	48 100.0

CHI SQUARE = 7.14343 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.38577
CONTINGENCY COEFFICIENT = 0.35992
KENDALL'S TAU B = 0.25336
KENDALL'S TAU C = 0.29167
GAMMA = 0.41791
SOMER'S D = 0.20715

31. A policy should be established by the Congress stating the extent to which and under what circumstances, Government agencies should participate in the cost of contractor's IR&D and B&P efforts.

VAR031

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	17 56.7 89.5 35.4	8 26.7 61.5 16.7	2 6.7 100.0 4.2	3 10.0 33.3 6.3	0 0.0 0.0 0.0	30 62.5
NOT KR	60.	2 11.1 10.5 4.2	5 27.8 38.5 10.4	0 0.0 0.0 0.0	6 33.3 66.7 12.5	5 27.8 100.0 10.4	18 37.5
	COLUMN TOTAL	19 39.6	13 27.1	2 4.2	9 18.8	5 10.4	48 100.0

CHI SQUARE = 18.70337 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.62422
CONTINGENCY COEFFICIENT = 0.52952
KENDALL'S TAU B = .51520
KENDALL'S TAU C = 0.60069
GAMMA = 0.77232
SOMER'S = 0.41567

32. It is important for agreement to be reached between the Government agency and its contractors in advance of the incurrence of costs in categories where reasonableness or allocability are difficult to determine (such as IR&D) in order that possible subsequent disallowances or disputes may be avoided.

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	VAR032 STRONGLY DISAGREE 1.	DISAGREE 2.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	3	4	10	13	30
		10.0	13.3	33.3	43.3	62.5
		100.0	100.0	50.0	61.9	
		6.3	8.3	20.8	27.1	
NOT KR	60.	0	0	10	8	18
		0.0	0.0	55.6	44.4	37.5
		0.0	0.0	50.0	38.1	
		0.0	0.0	20.8	16.7	
	COLUMN TOTAL	3	4	20	21	48
		6.3	8.3	41.7	43.8	100.0

CHI SQUARE = 5.52651 WITH 3 DEGREES OF FREEDOM
CRAMER'S V = 0.33952
CONTINGENCY COEFFICIENT = 0.32158
KENDALL'S TAU B = 0.12197
KENDALL'S TAU C = 0.13194
GAMMA = 0.22619
SOMER'S D = 0.10570

33.(a) IR&D and B&P costs should be accepted by Government as an overhead item without question as to amount for contractor cost centers with 50% or more fixed-price Government contracts and sales of commercial products and services.

VAR033

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGRE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	0 0.0 0.0 0.0	2 6.7 22.2 4.2	1 3.3 100.0 2.1	9 30.0 100.0 18.8	18 60.0 100.0 37.5	30 62.5
NOT KR	60.	11 61.1 100.0 22.9	7 38.9 77.8 14.6	0 0.0 0.0 0.0	0 0.0 0.0 0.0	0 0.0 0.0 0.0	18 37.5
	COLUMN TOTAL	11 22.9	9 18.8	1 2.1	9 18.8	18 37.5	48 100.0

CHI SQUARE = 41.36295 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.92829
CONTINGENCY COEFFICIENT = 0.68034
KENDALL'S TAU B = -0.77730
KENDALL'S TAU C = -0.91319
GAMMA = -1.00000
SOMER'S D = -0.62028

34.(b) Reasonableness of costs for other contractors should be determined by the present DOD formula with individual ceilings for IR&D and B&P negotiated and trade-offs between the two accounts permitted.

VAR034

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGRE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	4 13.3 100.0 8.3	6 20.0 60.0 12.5	2 6.7 66.7 4.2	11 36.7 52.4 22.9	6 20.0 75.0 12.5	1 3.3 50.0 2.1	30 62.5
NOT KR	60.	0 0.0 0.0 0.0	4 22.2 40.0 8.3	1 5.6 33.3 2.1	10 55.6 47.6 20.8	2 11.1 25.0 4.2	1 5.6 50.0 2.1	18 37.5
	COLUMN TOTAL	4 8.3	10 20.8	3 6.3	21 43.8	8 16.7	2 4.2	48 100.0

CHI SQUARE = 4.03301 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.28986
CONTINGENCY COEFFICIENT = 0.27840
KENDALL'S TAU B = 0.07595
KENDALL'S TAU C = 0.08854
GAMMA = 0.13043
SOMER'S D = 0.06108

35.(a) Cost centers with more than 50% cost-type contracts should be subject to a relevancy requirement of a potential relationship to the agency function or operation in the opinion of the head of the agency, with respect to IR&D and B&P costs.

VAR035

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGRE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	15 50.0 93.8 31.3	8 26.7 80.0 16.7	1 3.3 25.0 2.1	4 13.3 28.6 8.3	1 3.3 33.3 2.1	1 3.3 100.0 2.1	30 62.5
NOT KR	60.	1 5.6 6.3 2.1	2 11.1 20.0 4.2	3 16.7 75.0 6.3	10 55.6 71.4 20.8	2 11.1 66.7 4.2	0 0.0 0.0 0.0	18 37.5
	COLUMN TOTAL	16 33.3	10 20.8	4 8.3	14 29.2	3 6.3	1 2.1	48 100.0

CHI SQUARE = 18.93839 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.62813
CONTINGENCY COEFFICIENT = 0.53190
KENDALL'S TAU B = 0.47755
KENDALL'S TAU C = 0.56597
GAMMA = 0.70259
SOMER'S D = 0.37775

36.(b) No relevancy restriction should be applied to the other contractors.

VAR036

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGRE 1.	DISAGREE 2.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	0 0.0 0.0 0.0	1 3.3 8.3 2.1	11 36.7 100.0 22.9	17 56.7 100.0 35.4	1 3.3 33.3 2.1	30 62.5
NOT KR	60.	5 27.8 100.0 10.4	11 61.1 91.7 22.9	0 0.0 0.0 0.0	0 0.0 0.0 0.0	2 11.1 66.7 4.2	18 37.5
	COLUMN TOTAL	5 10.4	12 25.0	11 22.9	17 35.4	3 6.3	48 100.0

CHI SQUARE = 41.24442 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.92696
CONTINGENCY COEFFICIENT = 0.67982
KENDALL'S TAU B = -0.60381
KENDALL'S TAU C = -0.71354
GAMMA = -0.77989
SOMER'S D = -0.47902

37. Allowable IR&D and B&P costs for companies not required to negotiate advance agreements should be established by a historically based formula, either on a companywide basis or by profit centers.

VAR037

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	7	5	5	10	3	30
		23.3	16.7	16.7	33.3	10.0	62.5
		87.5	41.7	100.0	55.6	60.0	
		14.6	10.4	10.4	20.8	6.3	
NOT KR	60.	1	7	0	8	2	18
		5.6	38.9	0.0	44.4	11.1	37.5
		12.5	58.3	0.0	44.4	40.0	
		2.1	14.6	0.0	16.7	4.2	
	COLUMN TOTAL	8	12	5	18	5	48
		16.7	25.0	10.4	37.5	10.4	100.0

CHI SQUARE = 7.73926 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.40154
CONTINGENCY COEFFICIENT = 0.37262
KENDALL'S TAU B = 0.09679
KENDALL'S TAU C = 0.11453
GAMMA = 0.16019
SOMER'S D = 0.07666

38. If IR&D allowances to Government contractors are not related directly to current or prospective Government procurement, financial support should also be provided to companies with similar capabilities which do not hold Government contracts as a means of supporting and strengthening industrial technology.

VAR038

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	ROW TOTAL
KR	50.	17	8	1	4	0	30
		56.7	26.7	3.3	13.3	0.0	62.5
		73.9	61.5	100.0	40.0	0.0	
		35.4	16.7	2.1	8.3	0.0	
NOT KR	60.	6	5	0	6	1	18
		33.3	27.8	0.0	33.3	5.6	37.5
		26.1	38.5	0.0	60.0	100.0	
		12.5	10.4	0.0	12.5	2.1	
	COLUMN TOTAL	23	13	1	10	1	48
		47.9	27.1	2.1	20.8	2.1	100.0

CHI SQUARE = 5.71005 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.34496
CONTINGENCY COEFFICIENT = 0.32606
KENDALL'S TAU B = 0.26364
KENDALL'S TAU C = 0.20167
GAMMA = 0.44920
SOMER'S D = 0.22340

39. A systematic method of disseminating information on IR&D projects that are in process is needed in order to help prevent unnecessary duplication on Government sponsored research.

VAR039

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 5.	ROW TOTAL
KP	50.	9	7	9	3	2	30
		30.0	23.3	30.0	10.0	6.7	62.5
		90.0	77.8	47.4	37.5	100.0	
		18.8	14.6	18.8	6.3	4.2	
NOT KP	60.	1	2	10	5	0	18
		5.6	11.1	55.6	27.8	0.0	37.5
		10.0	22.2	52.6	62.5	0.0	
		2.1	4.2	20.8	10.4	0.0	
	COLUMN TOTAL	10	9	19	8	2	48
		20.8	18.8	39.6	16.7	4.2	100.0

CHI SQUARE = 9.31243 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.44046
CONTINGENCY COEFFICIENT = 0.40309
KENDALL'S TAU B = 0.29686
KENDALL'S TAU C = 0.23681
GAMMA = 0.47087
SOMERS'S D = 0.22904

40. A provision should be established whereby the Government would have sufficient access to the contractor's records for its commercial business to enable a determination that IR&D and B&P costs are allowable.

VAR040

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KP	50.	12	5	2	9	0	2	30
		40.0	16.7	6.7	30.0	0.0	6.7	62.5
		85.7	71.4	100.0	56.3	0.0	100.0	
		25.0	10.4	4.2	18.8	0.0	4.2	
NOT KP	60.	2	2	0	7	7	0	18
		11.1	11.1	0.0	38.9	38.9	0.0	37.5
		14.3	28.6	0.0	43.8	100.0	0.0	
		4.2	4.2	0.0	14.6	14.6	0.0	
	COLUMN TOTAL	14	7	2	16	7	2	48
		29.2	14.6	4.2	33.3	14.6	4.2	100.0

CHI SQUARE = 17.79947 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.60880
CONTINGENCY COEFFICIENT = 0.52001
KENDALL'S TAU B = 0.38315
KENDALL'S TAU C = 0.45469
GAMMA = 0.53268
SOMERS'S D = 0.30127

41. As an alternative to any allocation to contracts, the Government should subsidize IR&D and B&P costs. A non-profit cost center approach should be taken wherein contractors who desire to so participate, set up designated "non-profit" cost centers whereby the Government would grant a certain amount of money. The amount could be based on a certain percentage of the company's business, or it could simply be an arbitrary amount. The contractor in turn would credit such funds to a non-profit cost center and would be free to use the funds to finance any effort as long as public disclosure is made periodically as to the source and application of such funds.

VAR041

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGRE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	MISSING VALUES 6.	ROW TOTAL
KR	50.	19	6	1	2	2	30
		63.3	20.0	3.3	6.7	6.7	62.5
		73.1	60.0	50.0	25.0	100.0	
		39.6	12.5	2.1	4.2	4.2	
NOT KR	60.	7	4	1	6	0	18
		38.9	22.2	5.6	33.3	0.0	37.5
		26.9	40.0	50.0	75.0	0.0	
		14.6	8.3	2.1	12.5	0.0	
	COLUMN TOTAL	26	10	2	8	2	48
		54.2	20.8	4.2	16.7	4.2	100.0

CHI SQUARE = 7.40102 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.39267
CONTINGENCY COEFFICIENT = 0.36550
KENDALL'S TAU B = 0.22967
KENDALL'S TAU C = 0.25000
GAMMA = 0.38915
SOMER'S D = 0.19780

42. Total abandonment should be made of the current IR&D and B&P mechanism as it is now managed. A shift should be made to:

(a) A tax credit device for offsetting one year's allowed expenditure against the current or subsequent year's tax (similar to present investment tax credit mechanisms).

VAR042

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	17	6	2	1	1	3	30
		56.7	20.0	6.7	3.3	3.3	10.0	62.5
		73.9	60.0	25.0	33.3	100.0	100.0	
		35.4	12.5	4.2	2.1	2.1	6.3	
NOT KR	60.	6	4	6	2	0	0	18
		33.3	22.2	33.3	11.1	0.0	0.0	37.5
		26.1	40.0	75.0	66.7	0.0	0.0	
		12.5	8.3	12.5	4.2	0.0	0.0	
	COLUMN TOTAL	23	10	8	3	1	3	48
		47.9	20.8	16.7	6.3	2.1	6.3	100.0

CHI SQUARE = 9.59281 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.44707
CONTINGENCY COEFFICIENT = 0.40814
KENDALL'S TAU B = 0.17083
KENDALL'S TAU C = 0.19444
GAMMA = 0.28000
SOMER'S D = 0.14070

43. (b) The fee or profit on a contract should be based in part on Return on Investment and capitalized IR&D and B&P costs should be included in the investment base.

VAR043

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	MISSING VALUES 6.	ROW TOTAL
KR	50.	20	6	1	2	1	30
		66.7	20.0	3.3	6.7	3.3	62.5
		76.9	60.0	20.0	33.3	100.0	
		41.7	12.5	2.1	4.2	2.1	
NOT KR	60.	6	4	4	4	0	18
		33.3	22.2	22.2	22.2	0.0	37.5
		23.1	40.0	80.0	66.7	0.0	
		12.5	8.3	8.3	8.3	0.0	
	COLUMN TOTAL	26	10	5	6	1	48
		54.2	20.8	10.4	12.5	2.1	100.0

CHI SQUARE = 8.96547 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.43218
CONTINGENCY COEFFICIENT = 0.39672
KENDALL'S TAU B = 0.31789
KENDALL'S TAU C = 0.34722
GAMMA = 0.52083
SOMER'S D = 0.27285

44. The definition of reasonableness must vary with individual cases. Below $2 million dollars spent annually for IR&D by a contractor, reasonableness should be determined by application of a historical formula or by the CWAS technique. Above this threshold the Government should negotiate with the contractor in determining reasonableness.

VAR044

AFFIL	COUNT ROW PCT COL PCT TOT PCT	STRONGLY DISAGRE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	8 26.7 88.9 16.7	3 10.0 37.5 6.3	1 3.3 33.3 2.1	15 50.0 62.5 31.3	2 6.7 66.7 4.2	1 3.3 100.0 2.1	30 62.5
NOT KR	60.	1 5.6 11.1 2.1	5 27.8 62.5 10.4	2 11.1 66.7 4.2	9 50.0 37.5 18.8	1 5.6 33.3 2.1	0 0.0 0.0 0.0	18 37.5
	COLUMN TOTAL	9 18.8	8 16.7	3 6.3	24 50.0	3 6.3	1 2.1	48 100.0

CHI SQUARE = 6.51851 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.36851
CONTINGENCY COEFFICIENT = 0.34578
KENDALL'S TAU B = 0.02462
KENDALL'S TAU C = 0.02778
GAMMA = 0.04233
SOMER'S D = 0.02046

45. There are possible inequities to the Government when contractors develop products under IR&D programs in defense/space cost centers and market them in commercial cost centers.

VAR045

AFFIL	COUNT ROW PCT COL PCT TOT PCT	STRONGLY DISAGRE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	12 40.0 85.7 25.0	6 20.0 85.7 12.5	1 3.3 100.0 2.1	8 26.7 36.4 16.7	2 6.7 66.7 4.2	1 3.3 100.0 2.1	30 62.5
NOT KR	60.	2 11.1 14.3 4.2	1 5.6 14.3 2.1	0 0.0 0.0 0.0	14 77.8 63.6 29.2	1 5.6 33.3 2.1	0 0.0 0.0 0.0	18 37.5
	COLUMN TOTAL	14 29.2	7 14.6	1 2.1	22 45.8	3 6.3	1 2.1	48 100.0

CHI SQUARE = 12.46291 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.50955
CONTINGENCY COEFFICIENT = 0.45401
KENDALL'S TAU B = 0.32932
KENDALL'S TAU C = 0.37153
GAMMA = 0.54040
SOMER'S D = 0.27366

46. A significant portion of contractors' patents result from inventions arising from their IR&D programs.

VAR046

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	NO OPINION 3.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	2	5	5	12	5	1	30
		6.7	16.7	16.7	40.0	16.7	3.3	62.5
		100.0	62.5	35.7	75.0	71.4	100.0	
		4.2	10.4	10.4	25.0	10.4	2.1	
NOT KR	60.	0	3	9	4	2	0	18
		0.0	16.7	50.0	22.2	11.1	0.0	37.5
		0.0	37.5	64.3	25.0	28.6	0.0	
		0.0	6.3	18.8	8.3	4.2	0.0	
	COLUMN TOTAL	2	8	14	16	7	1	48
		4.2	16.7	29.2	33.3	14.6	2.1	100.0

CHI SQUARE = 7.35047 WITH 5 DEGREES OF FREEDOM
CRAMER'S V = 0.39130
CONTINGENCY COEFFICIENT = 0.36527
KENDALL'S TAU B = -0.12446
KENDALL'S TAU C = -0.15972
GAMMA = -0.21801
SOMERS'S D = -0.10611

47 For any IR&D project which the Government supports fully or on a cost-sharing basis, the Government should be entitled to information and royalty-free rights to any invention arising therefrom.

VAR047

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	STRONGLY DISAGREE 1.	DISAGREE 2.	AGREE 4.	STRONGLY AGREE 5.	MISSING VALUES 6.	ROW TOTAL
KR	50.	16	4	9	0	1	30
		53.3	13.3	30.0	0.0	3.3	62.5
		100.0	66.7	75.0	0.0	100.0	
		33.3	8.3	18.8	0.0	2.1	
NOT KR	60.	0	2	3	13	0	18
		0.0	11.1	16.7	72.2	0.0	37.5
		0.0	33.3	25.0	100.0	0.0	
		0.0	4.2	6.3	27.1	0.0	
	COLUMN TOTAL	16	6	12	13	1	48
		33.3	12.5	25.0	27.1	2.1	100.0

CHI SQUARE = 32.71107 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.82552
CONTINGENCY COEFFICIENT = 0.63662
KENDALL'S TAU B = 0.63350
KENDALL'S TAU C = 0.75174
GAMMA = 0.85743
SOMERS'S D = 0.51001

48. IR&D and B&P costs should include: (check one)

(a) Only direct costs.

(b) Direct costs and G&A costs.

(c) Direct costs, and all allocable indirect costs, except G&A costs should not be considered allocable

(d) Direct costs, allocable indirect costs and G&A costs applicable to the IR&D effort.

VAR048

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	ONLY DIRECT 7.	DIRECT AND G&A 8.	DIRECT AND INDIR 9.	DIRECT INDIRECT 10.	ROW TOTAL
KR	50.	7	1	19	3	30
		23.3	3.3	63.3	10.0	62.5
		70.0	50.0	76.0	27.3	
		14.6	2.1	39.6	6.3	
NOT KR	60.	3	1	6	8	18
		16.7	5.6	33.3	44.4	37.5
		30.0	50.0	24.0	72.7	
		6.3	2.1	12.5	16.7	
	COLUMN TOTAL	10	2	25	11	48
		20.8	4.2	52.1	22.9	100.0

CHI SQUARE = 8.14157 WITH 3 DEGREES OF FREEDOM
CRAMER'S V = 0.41184
CONTINGENCY COEFFICIENT = 0.38081
KENDALL'S TAU B = 0.25855
KENDALL'S TAU C = 0.28125
GAMMA = 0.42632
SOMER'S D = 0.22283

49. The most effective and practical technique for determining reasonableness of IR&D is: (check one)

(1) Technical evaluation
(2) Industry norms by industry group
(3) Historical record of each contractor
(4) Other (specify)

VAR049

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	MISSING VALUES 6.	TECH EVAL 11.	INDUSTRY NORM 12.	HISTORICAL RECOR 13.	OTHER 14.	ROW TOTAL
KR	50.	1	10	3	5	11	30
		3.3	33.3	10.0	16.7	36.7	62.5
		100.0	66.7	50.0	55.6	64.7	
		2.1	20.8	6.3	10.4	22.9	
NOT KR	60.	0	5	3	4	6	18
		0.0	27.8	16.7	22.2	33.3	37.5
		0.0	33.3	50.0	44.4	35.3	
		0.0	10.4	6.3	8.3	12.5	
COLUMN TOTAL		1	15	6	9	17	48
		2.1	31.3	12.5	18.8	35.4	100.0

CHI SQUARE = 1.33159 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.16656
CONTINGENCY COEFFICIENT = 0.16429
KENDALL'S TAU B = 0.03125
KENDALL'S TAU C = 0.02646
GAMMA = 0.05316
SOMER'S D = 0.02512

50. Concerning alternate ways of allocating or recovering IR&D and B&P costs, the most favored allocation is by: (check one)
(1) Continuation of recovery through overhead allocation.
(2) Recovery via a direct contract or grant.
(3) Recovery through profit.
(4) Other (specify).

VAR050

AFFIL	COUNT / ROW PCT / COL PCT / TOT PCT	MISSING VALUES 6.	OVERHEAD 15.	DIRECT CONTRACT 16.	PROFIT 17.	50.	ROW TOTAL
KR	50.	1	26	0	2	1	30
		3.3	86.7	0.0	6.7	3.3	62.5
		100.0	68.4	0.0	50.0	100.0	
		2.1	54.2	0.0	4.2	2.1	
NOT KR	60.	0	12	4	2	0	18
		0.0	66.7	22.2	11.1	0.0	37.5
		0.0	31.6	100.0	50.0	0.0	
		0.0	25.0	8.3	4.2	0.0	
COLUMN TOTAL		1	38	4	4	1	48
		2.1	79.2	8.3	8.3	2.1	100.0

CHI SQUARE = 8.70175 WITH 4 DEGREES OF FREEDOM
CRAMER'S V = 0.42578
CONTINGENCY COEFFICIENT = 0.39175
KENDALL'S TAU B = 0.26257
KENDALL'S TAU C = 0.21528
GAMMA = 0.55357
SOMER'S D = 0.30024

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For some time there has been controversy about and an increasing amount of attention to business costs which have been labeled as independent research and development (IR&D) and bid and proposal (B&P) costs. This thesis examines these costs in order to bring clearer understanding to what they are, why they are undertaken, how they are accounted for, and how they should be managed and paid for. This is accomplished by reviewing the objectives of IR&D and B&P costs, examining the past and present environment in which these

20. (cont'd)

efforts have been and are being conducted, and identifying issues and problems confronting both industry and Government. Because the Department of Defense is the largest Government procurer, emphasis is placed on its policies and procedures and the effects they have on industry.

Research for this thesis was conducted by (1) review of related literature, (2) interviews with knowledgeable personnel, and (3) a questionnaire which was sent to personnel in Government and industry who are directly involved with these costs.

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Thesis
B124 Badgett
c.1 The allowability and allocability of independent research and development (IR&D) and bid and proposal (B&P) costs.